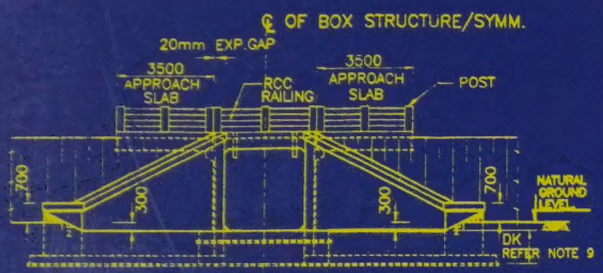
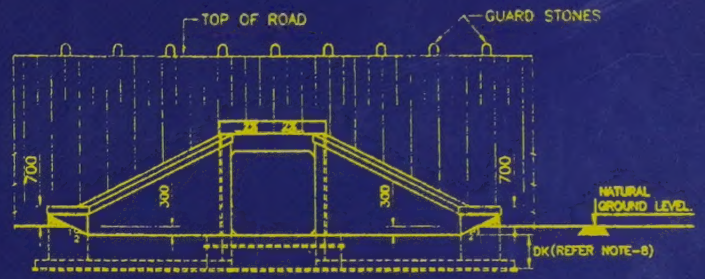
STANDARD PLANS FOR SINGLE, DOUBLE AND TRIPLE CELL BOX CULVERTS WITH AND WITHOUT EARTH CUSHION



SINGLE CELL



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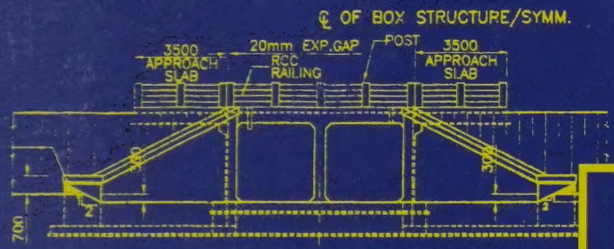

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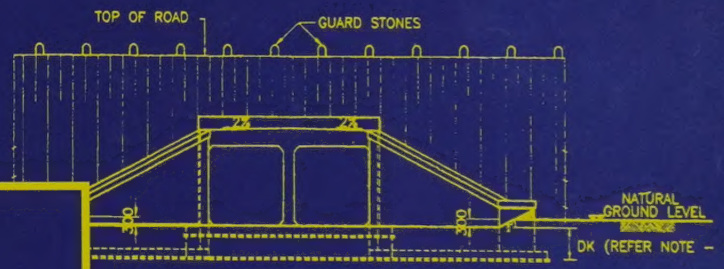
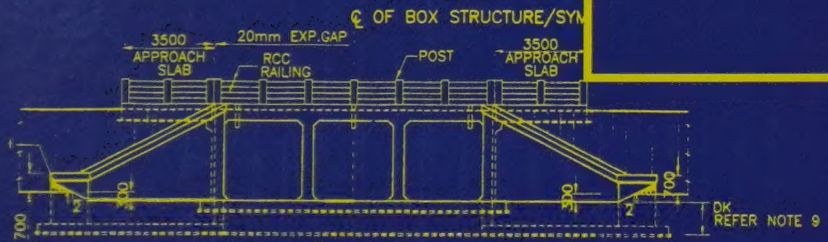
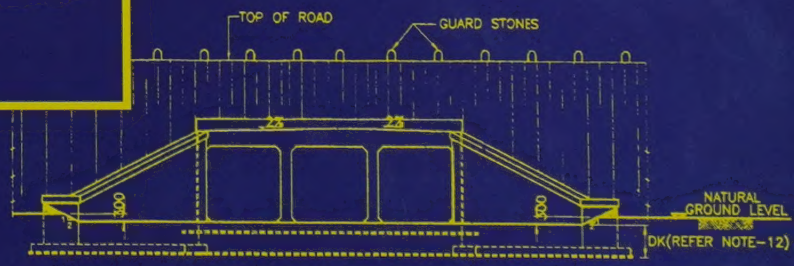


DOUBLE CELL

GOVT. OF INDIA
MINISTRY OF SURFACE TRANSPORT
DEPT. OF ROAD TRANSPORT & HIGHWAYS
NEW DELHI
2000



TRIPLE CELL
WITHOUT EARTH CUSHION



TRIPLE CELL
WITHOUT EARTH CUSHION

Ministry of Surface Transport
(Roads Wing)

STANDARD DRAWINGS FOR BOX CELL CULVERTS

Published by
The Indian Roads Congress
On behalf of the Govt. of India,
Ministry of Surface Transport (Roads Wing)

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FOREWORD

The Standard Highway Plans for Box–Culverts with varying depth of earth filling, using high yield strength deformed bars, are being brought out for the first time. As Box–Culverts, being economical, are the basic feature related to development of any highway stretch, it was found that considerable time and duplication efforts can be avoided by adopting standard plan for Box–Culvert Structures.

This volume. the first in the series of standard drawings for Box–Culverts, contains standard plans for 104 combinations of Box–Culverts with various heights of earth filling (i.e. 0.0m, 3.0m, 4.0m and 5.0m heights of earth filling) and covers. The clear span variation of 2.0m to 8.0m with combinations of clear height of 2.0m to 7.0m. This volume contains the most common options of single cell box–culvert, double cell box–culvert and triple cell box–culvert. It also contains the standard drawings for PCC wing walls, curtain walls, floor protection details and other relevant details related to box–culverts.

The designs are based on Standard Specifications and Code of Practice for Highway Bridges issued by Indian Roads Congress. Special attention has been given to durability aspects of the structure by adopting various provisions of IRC:21–1997. For construction purposes, Specifications for Road and Bridge Works issued by Ministry of Surface Transport (Roads Wing), Government of India, as amended from time to time, will apply. The standard drawings can be adopted for cross–drainage as well as underpass structures.

The plans have been made complete in all respects so that they can be readily adopted for preparation of estimates and serve as construction drawings in the field.

To simplify the estimation work, the quantities for major items for each of 104 cases are included in a tabular form. A great deal of attention has been paid to dimensioning and detailing so as to ensure proper placement and compaction of concrete during construction. I have no doubt, the adoption of these Standard Plan/Drawing will not only result in faster construction but will also enhance the quality and durability of Box–Culvert Structures.

Every possible care has been taken to eliminate errors in the Drawings. Users are requested to bring to our notice errors and omissions, if any, which may come to their notice during the use of these drawings in the filed.

The work of preparing the Designs and Drawings was carried out by M/s Consulting Engineering Services (I) Ltd. and independent proof checking by M/s Tandon Consultants Pvt. Ltd., New Delhi. Equally valuable contributions in the finalisation of the design and details were made by Officers of MOST. The enthusiasm and dedication which this team has brought to bear on the task are to be highly appreciated.

(Prafulla Kumar)
Director General (Road Development &
Additional Secretary to the Govt. of India)

New Delhi
March 31, 2000

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DRG.NO. SD/100

WITH EARTH CUSHION CASES

1.1 SINGLE CELL BOX

S.NO.	Nc/ab/Ec
1.	1/22/3
2.	1/22/4
3.	1/22/5
4.	1/23/3
5.	1/23/4
6.	1/23/5
7.	1/33/3
8.	1/33/4
9.	1/33/5
10.	1/34/3
11.	1/34/4
12.	1/34/5
13.	1/43/3
14.	1/43/4
15.	1/43/5
16.	1/44/3
17.	1/44/4
18.	1/44/5
19.	1/45/3
20.	1/45/4

S.NO.	Nc/ab/Ec
21.	1/45/5
22.	1/53/3
23.	1/53/4
24.	1/53/5
25.	1/54/3
26.	1/54/4
27.	1/54/5
28.	1/55/3
29.	1/55/4
30.	1/55/5
31.	1/63/3
32.	1/63/4
33.	1/63/5
34.	1/64/3
35.	1/64/4
36.	1/64/5
37.	1/65/3
38.	1/65/4
39.	1/65/5
40.	1/66/3

S.NO.	Nc/ab/Ec
41.	1/66/4
42.	1/66/5
43.	1/75/3
44.	1/75/4
45.	1/75/5
46.	1/76/3
47.	1/76/4
48.	1/76/5
49.	1/77/3
50.	1/77/4
51.	1/77/5
52.	1/85/3
53.	1/85/4
54.	1/85/5
55.	1/86/3
56.	1/86/4
57.	1/86/5
58.	1/87/3
59.	1/87/4
60.	1/87/5

1.2 DOUBLE CELL BOX

S.NO.	Nc/ab/Ec
1.	2/22/3
2.	2/22/4
3.	2/22/5
4.	2/23/3
5.	2/23/4
6.	2/23/5
7.	2/32/3
8.	2/32/4
9.	2/32/5
10.	2/33/3
11.	2/33/4
12.	2/33/5

1.3 TRIPLE CELL BOX

S.NO.	Nc/ab/Ec
1.	3/32/3
2.	3/32/4
3.	3/32/5
4.	3/33/3
5.	3/33/4
6.	3/33/5

WITHOUT EARTH CUSHION CASES

1.4 SINGLE CELL BOX

S.NO.	Nc/ab/Ec
1.	1/22/0
2.	1/23/0
4.	1/33/0
5.	1/43/0
6.	1/44/0
7.	1/45/0
8.	1/53/0
9.	1/54/0
10.	1/55/0
11.	1/63/0
12.	1/64/0
13.	1/65/0
14.	1/66/0
15.	1/75/0
16.	1/76/0
17.	1/77/0
18.	1/85/0
19.	1/86/0
20.	1/87/0

1.5 DOUBLE CELL BOX

S.NO.	Nc/ab/Ec
1.	2/22/0
2.	2/23/0
3.	2/32/0
4.	2/33/0

1.6 TRIPLE CELL BOX

S.NO.	Nc/ab/Ec
1.	3/32/0
2.	3/33/0

NOTES:

1. THIS INDEX SHEET DEFINES THE VARIOUS SIZE OPTIONS OF BOX CULVERT INCLUDED IN THESE STANDARD PLANS.
2. Nc / ab / Ec STANDS FOR NO. OF CELLS / CLEAR WIDTH – CLEAR HEIGHT / HEIGHT OF EARTH CUSHION.

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

INDEX SHEET

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/100

DRG.NO. SD/101

(A) GENERAL

1. These notes are applicable for the Standard Drawings of R.C.C Box Cell Structures with earth cushion (3m,4m & 5m) and without earth cushions. For intermediate heights immediately higher value of earth cushion can be taken for standard drgs.

2. These drawings are applicable for right crossings with overall width of 12m for the roadway on top.

3. All dimensions are in millimeters unless otherwise mentioned. Only written dimensions are to be followed. No drawing shall be scaled.

4. Box cell designation i.e. Nc/ab/Ec stands for No. of cells/Clear width–Cear height/Height of earth cushion.

5. Design criteria:

   I. The design is according to the following codes:
   (a) I R C : 5–1985
   (b) I R C : 6–1966 (1985 reprint)
   (c) I R C : 21–1987(1997 reprint)
   (d) I R C : 78–1985

   II. The following loads have been considered in the design:

   (a) One lane of IRC class 70R or two lanes of class A on carriage way, which ever governs.

   (b) Wearing coat load of 3 KN/sq.m.

   III. The design are applicable for 'MODERATE' AND 'SEVERE' conditions of exposure.

6. Wearing coat shall consist of the following for Box Cell Structures without earth cushions.

   I.a A coat of mastic asphalt 12mm thick with a prime coat over the top of deck is to be provided before the wearing coat is laid.

   I.b 50 mm thick asphaltic concrete wearing coat as per Clause 512 of MOST's Specifications for Roads and Bridge Works (Third Revision–1995).

   II. In case of isolated construction of Box Cell Structures located in remote areas where provision of mastic and asphaltic concrete wearing coat is not practicable, Engineer–in–charge may permit provision of 75mm thick cement concrete wearing coat in M30 grade concrete with maximum water cement ratio as 0.40. The rienforcement shall be consist of 8mmø High Yield Strength Deformed bars @ 200mm centers in both direction over a strip of 300mm near the expansion joint. Reinforcement shall be placed at the centre of the centre of the wearing coat. wearing coat shall be discontinued at expansion joint locations. Joint filters shall extend upto the top of wearing coat.

   III. For Box Cell Structures with earth cushion, no wearing coat shall be provided.

7. Type/position of return walls, railings, guards, posts, ramp, etc. in approach portion shall be decided by the Engineer–in–charge.

8. Lowest point in the proposed Box Cell plan area is assumed as Natural Ground level.

9. Invert level of Top surface of Bottom Slab is assumed as Bed Level

(B) MATERIAL SPECIFICATIONS

CONCRETE

1. Concrete shall be design mix and shall have minimum 28 days characteristic strength on 150mm cubes for all elements of structure as indicated below:

Element	Concrete grade		Characteristic strength (MPa)	
	Moderate condition of exposure.	Severe condition of exposure.	Moderate condition of exposure.	Severe condition of exposure.
(a) Box.Cell Structure	M 20	M 25	20	25
(b) Wing Walls	M 20	M 20	20	20
(c) Curtain Wall	M 15	M 20	15	20
(d) Levelling Course	M 15	M 15	15	15

2. High strength ordinary Portland cement conforming to IS:8112 or ordinary Portland cement conforming to IS:269 capable of achiving the required design concrete strength shall only be used.

3. The minimum cement concrete and water cement ratio in the concrete design mix shall be 310 kg per cu.m and 0.45 respectively for 'MODERATE' conditions of exposure. The minimum cement content and maximum water cement ratio in the concrete design mix shall be 400 Kg/cu.m and 0.40 respectively for 'SEVERE' conditions of exposure.

4. The total chloride contents and Sulfuric anhydride (SO3) of all concrete as a percentage of mass of cement in mix shall be limited to 0.3% and 4% respectively.

5. The slump of concrete shall be checked as per IS:516, Concrete should have the slump of 50–75mm.

6. Use of admixtures such as super plasticisers for concrete may be made with the approval of the engineer–in–charge.

7. Aggregate shall confirm to CL 302.3 of IRC:21 –1987 (1997 reprint) and maximum aggregate size should not exceed 40mm.

REINFORCEMENT

1. All reinforcement shall be High Yield Strength Deformed bars (Grade designation S 415) conforming to IS:1786.

2. Unless otherwise shown on the drawing, bars are marked in numerical numbers (as ①, ② or ③) and corresponding information is provided in bar bending schedule. Bars configuration is shown as –

3. Spacing given for all reinforcement is perpendicular to bar unless otherwise shown on drawings.

EARTH FILL/EMBANKMENT

Back filling material should confirm to CL 305.2 of MOST specification and earth cushion embankment should be constructed in accordance to section 300 of MOST specification (THIRD REVISION 1995)

WATER

1. Water to be used in concreting and curing shall be conforming to Clause 302.4 of IRC 21–1987.

EXPANSION JOINT

1. The asphalt plug expansion joint shall be provided in accordance with MOST specification and shall be procured from manufacturers as approved by MOST

(C) WORKMANSHIP/DETAILING

1. Minimum clear cover to any reinforcement including stirrups shall be 50 mm unless otherwise shown in the drawings.

2. Construction Joints:

   I. The location and provision of construction joints shall be approved by Engineer–in–charge suggested location of construction joints in the direction parallel to the direction of water flow is shown in the General Arrangement drawings of Box Cell Structures.The concreting operation shall be carried out continuous upto the construction joints.

   II. The concrete surface at the joint shall be brushed with a stiff brush after casting while the concrete is still fresh and it has only slightly hardened.

   III. Before new concrete is poured the surface of old concrete shall be prepared as under:

   (a) For hardened concrete, the surface shall be thoroughly cleaned to remove debris/laitance and made rough so that 1/4 of the size of the aggregate is exposed.

   (b) For partially hardened concrete, the surface shall be treated by wire brush followed by an air jet.

   (c) The old surface shall be soaked with water without leaving puddles immediately, before starting concreting to prevent the absorption of water from new concrete.

   IV. New concrete shall be thoroughly compacted in the region of the joint.

3. Welding of reinforcement bars shall not be permitted.

4. Laps in reinforcement:

   I. Minimum lap length of reinforcement shall be decided as per the reinforcement arrangement based on the clause–304.6.6 of IRC:21–1987.

   II. Not more than 50% of reinforcement shall be lapped at any one location.

5. Bending of reinforcement bars shall be as per IS : 2502.

6. Supporting chairs of 12 mm diameter shall be provided at suitable intervals as per IS : 2502.

7. Concrete shall be produced in a mechanical mixer of capacity not less than 200 lts. having integral weigh–batching facility and automatic water measuring and dispensing device.

8. Proper compaction of concrete shall be ensured by use of full width screed vibrators for concrete.

9. Properly braced steel plates shall be used as shuttering.

10. Sharp edges of concrete shall be chamfered.

11. Filter media should be provided in accordance to clause 2504.2.2 of MOST specifications(THIRD REV.1995).

12. In presence of soil with aggressive soil condition, the concrete faces in contact with earth shall be protected with approved bituminous paint or coating as decided by the Engineer–in–change

(D) GENERAL SPECIFICATIONS

1. The work shall be executed in accordance with MOST's Specification for Road and Bridge Works (Third Revision, 1994) except wherever otherwise mentioned.

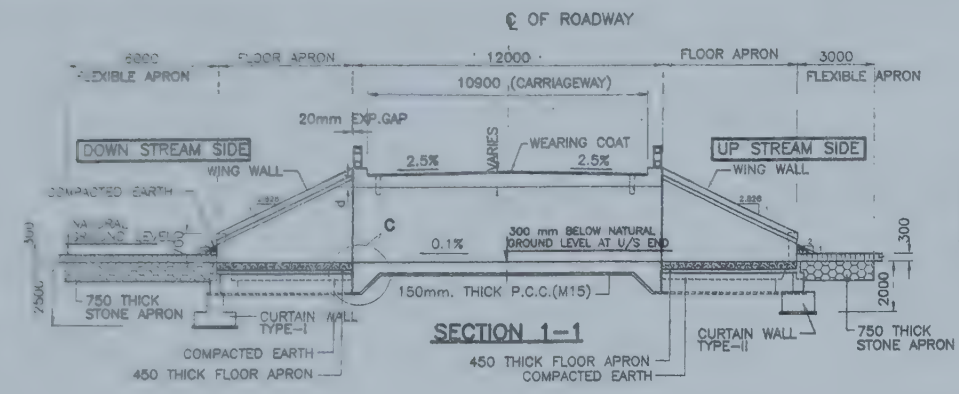
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

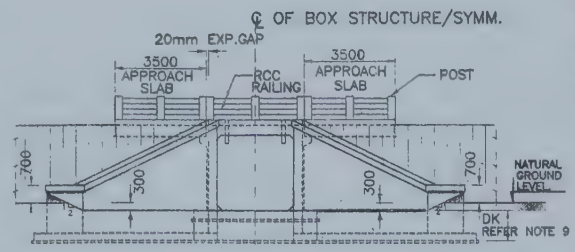
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

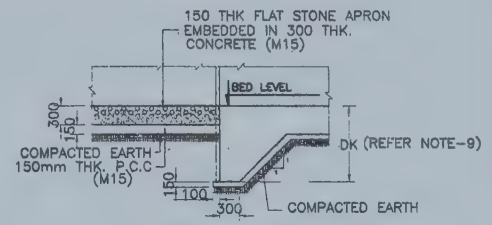
GENERAL NOTES

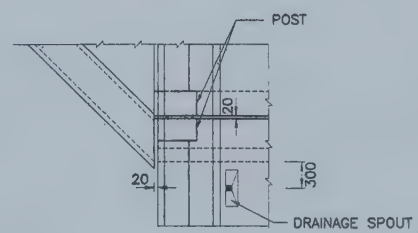
DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/101

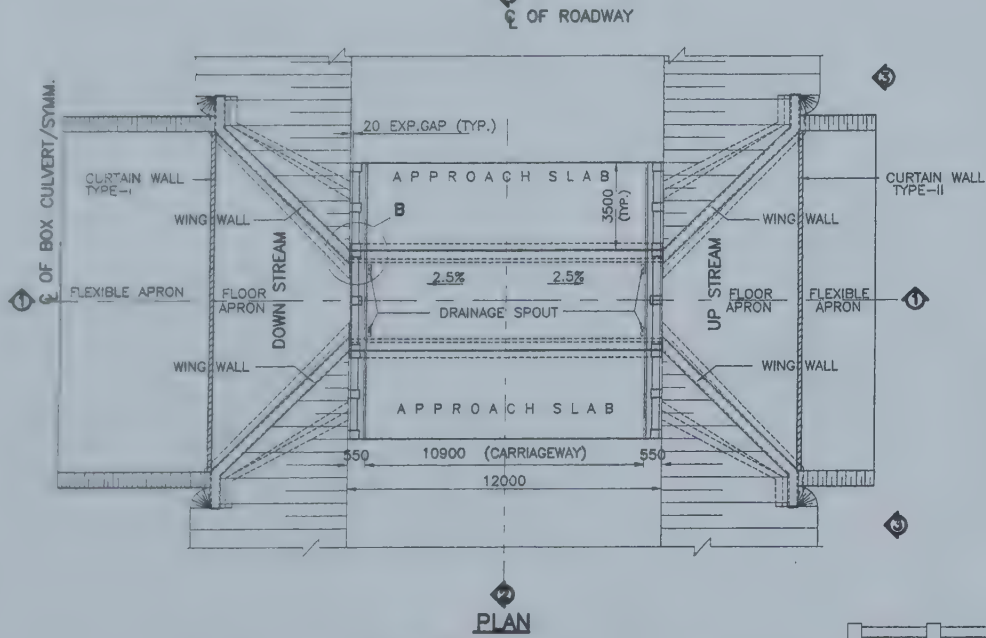
DRG.NO. SD/102

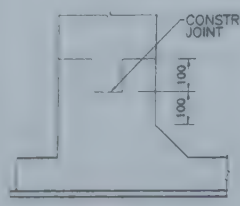


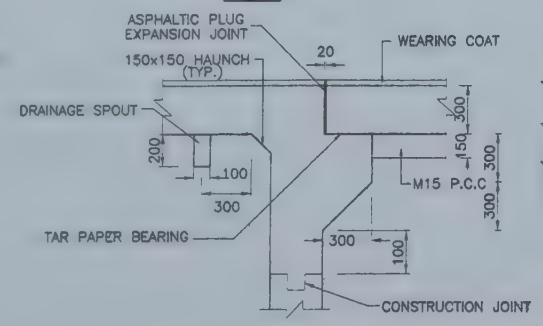


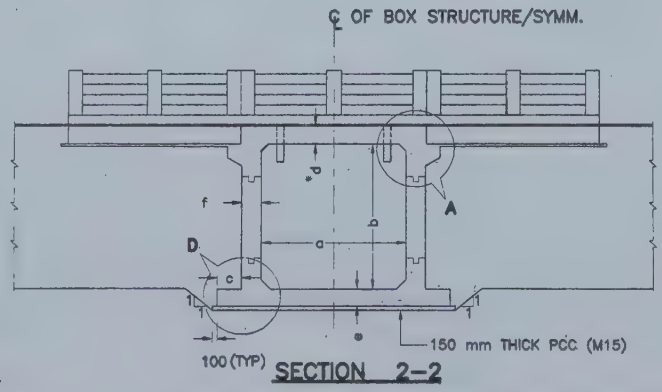












*d DECK SLAB THICKNESS AT INNER EDGE OF KERB AS SHOWN IN SECTION 1-1

TABLE SHOWING SALIENT DIMENSIONS

BOX CELL DESIGNATION No/ab/Eo	a (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	REQUIRED BEARING CAPACITY CATEGORY	DESIGN BASE PRESSURE (T/M^2)	ALLOWABLE DRAWDOWN AT A TIME (M)
1/22/0	2000	2000	500	350	380	380	C	11.62	0.00
1/23/0	2000	3000	1300	370	420	350	C	11.01	2.98
1/33/0	3000	3000	1100	420	420	420	C	10.50	2.15
1/34/0	3000	4000	1700	450	480	480	C	11.37	4.81
1/43/0	4000	3000	400	450	500	500	C	10.53	1.29
1/44/0	4000	4000	1200	480	550	550	C	11.07	3.99
1/45/0	4000	5000	1900	520	620	630	C	12.48	6.14
1/53/0	5000	3000	300	500	570	570	B	9.83	1.73
1/54/0	5000	4000	800	520	600	620	C	10.86	3.40
1/55/0	5000	5000	1500	580	680	700	C	12.40	5.81
1/63/0	6000	3000	300	680	720	720	B	9.88	2.96
1/64/0	6000	4000	300	680	720	750	C	10.93	3.18
1/65/0	6000	5000	1100	680	750	750	C	11.77	5.35
1/66/0	6000	6000	1800	700	800	850	C	13.21	7.50
1/75/0	7000	5000	800	750	850	850	C	11.59	4.86
1/76/0	7000	6000	1200	780	900	950	C	13.00	6.93
1/77/0	7000	7000	1300	780	950	950	C	13.10	7.18
1/85/0	8000	5000	300	800	950	950	C	11.37	4.83
1/86/0	8000	6000	900	820	970	1000	C	12.52	6.56
1/87/0	8000	7000	1300	850	1100	1200	C	14.36	8.62

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. FOR GENERAL NOTES AND REFERENCE DRAWINGS REFER DRG. NO. SD/101.
3. FOR REINFORCEMENT DETAILS REFER DRG. NO. SD/108.
4. FOR DETAILS OF WING WALL REFER DWG. NO. SD/113.
5. SOIL DENSITY ON THE BACKFILL SHOULD CONFORM TO CLAUSE 305.2.1.5 OF MOST SPECIFICATION.
6. NET BEARING CAPACITY REQUIRED FOR SOIL IS DIVIDED IN FOUR CATEGORIES AS SHOWN BELOW :

CATEGORY	::	NET BEARING CAPACITY REQUIRED FOR SOIL
A	::	5 T/M^2
B	::	10 T/M^2
C	::	15 T/M^2
D	::	20 T/M^2

7. SOFT AND LOOSE PATCHES IN THE BEARING AREA ARE TO BE REPLACED BY COMPACTED GRANULAR FILLS WITH LAYERS NOT EXCEEDING 300mm.
8. DESIGNS ARE GIVEN FOR THE BOX CELL CULVERTS ONLY. THESE HAVE NO BEARING WITH DESIGN OF EMBANKMENT WHICH WILL BE TAKEN UP BY ENGINEER-IN-CHARGE SEPERATELY
9. 'DK' IS DEPTH OF KEY AT BASE SLAB.

FOR BASE SLAB THICKNESS	VALUE OF 'DK'
UPTO 900mm	1200mm.
GREATER THAN 900mm	e+300mm

e = BASE SLAB THICKNESS

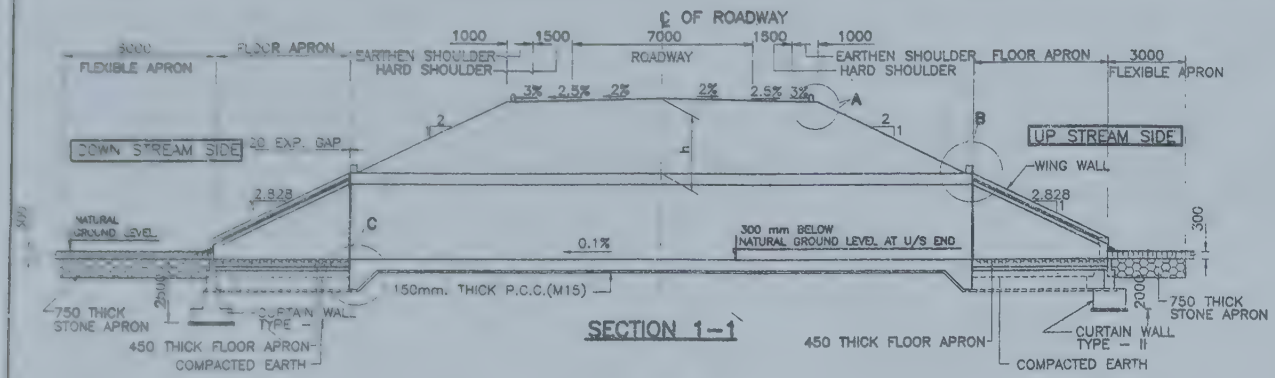
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

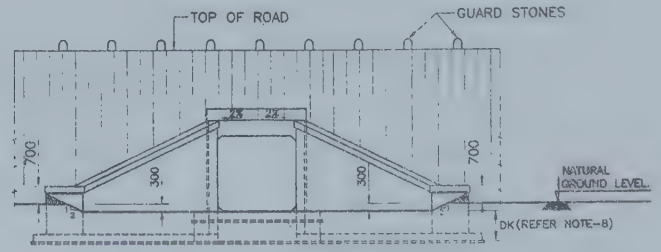
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

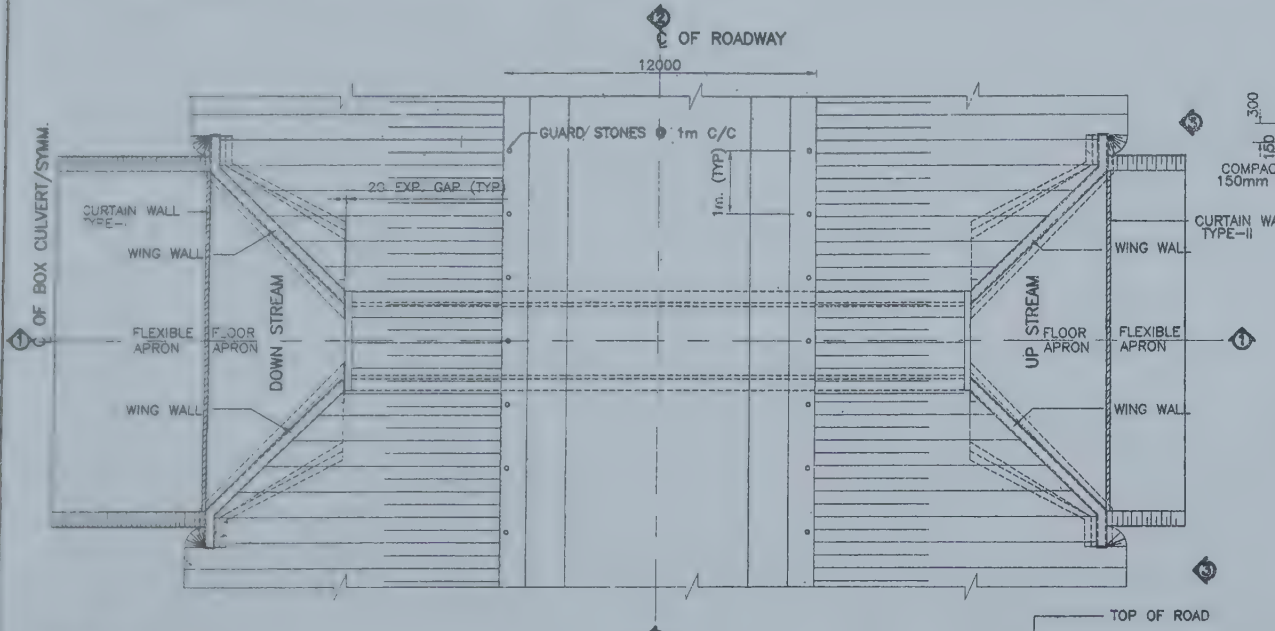
SINGLE CELL R.C.C BOX CULVERTS
2m x 2m TO 8m x7m
(WITHOUT EARTH CUSHION)
GENERAL ARRANGEMENT

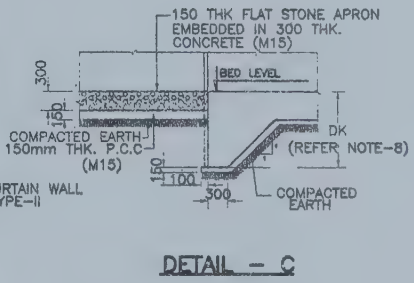
DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/102

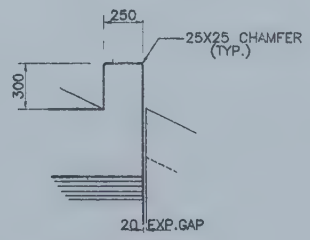
DRG.NO. SD/103 (SHEET 1 OF 2)

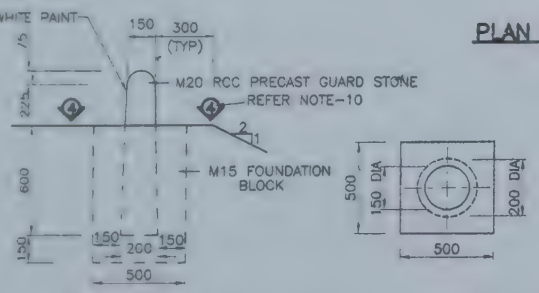


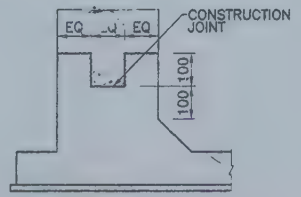




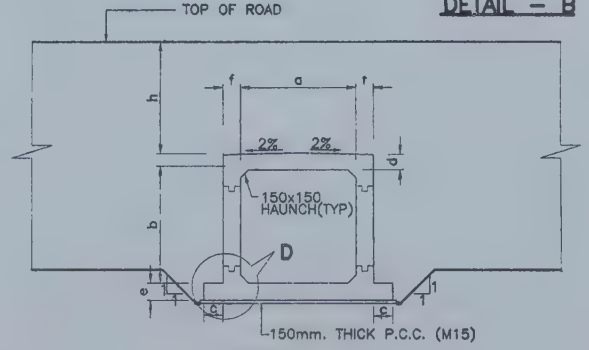








DETAIL OF PRECAST GUARD STONE @ 1m c/c



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED .ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. FOR GENERAL NOTES AND REFERENCE DRAWINGS REFER DRG. NO. SD/101.
3. FOR REINFORCEMENT DETAILS REFER DRG. NO. SD/109.
4. FOR DETAILS OF WING WALL REFER DWG. NO. SD/113.
5. SOIL DENSITY ON THE BACKFILL AND EARTH CUSHION SHOULD CONFIRM TO CLAUSE 305.2.1.5 OF MOST SPECIFICATION.
6. SOFT AND LOOSE PATCHES IN THE BEARING AREA ARE TO BE REPLACED BY COMPACTED GRANULAR FILLS WITH LAYERS NOT EXCEEDING 300mm.
7. DESIGNS ARE GIVEN FOR THE BOX CELL CULVERTS ONLY. THESE HAVE NO BEARING WITH DESIGN OF EMBANKMENT WHICH WILL BE TAKEN UP BY ENGINEER–IN–CHARGE SEPERATELY
8. 'DK' IS DEPTH OF KEY AT BASE SLAB.

FOR BASE SLAB THICKNESS	VALUE OF 'DK'
UPTO 900mm	1200mm.
GREATER THAN 900mm	e+300mm

e = BASE SLAB THICKNESS

9. FOR SECTION 2–2 DETAILS REFER DRAWING NO SD/103 (SHEET 1 OF 2)
10. FOR SECTION 4–4 DETAILS REFER DRAWING NO SD/109 (SHEET 1 OF 16)

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL R.C.C BOX CULVERT
2m x 2m TO 8m x7m
(WITH EARTH CUSHION)

GENERAL ARRANGEMENT

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/103 (SHEET 1 OF 2)

TABLE SHOWING SALIENT DIMENSIONS OF SINGLE CELL BOX CULVERT

BOX CELL DESIGNATION No/ab/Ec	a (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	h (mm)	REQUIRED BEARING CAPACITY CATEGORY	DESIGN BASE PRESSURE (T/M²)
1/22/3	2000	2000	600	250	300	250	3000	B	8.60
1/22/4	2000	2000	500	280	350	280	4000	C	10.17
1/22/5	2000	2000	500	300	350	300	5000	C	11.31
1/23/3	2000	3000	1100	280	300	350	3000	C	10.59
1/23/4	2000	3000	1000	320	370	400	4000	C	12.09
1/23/5	2000	3000	1100	320	350	380	5000	C	13.14
1/33/3	3000	3000	800	370	460	400	3000	C	10.35
1/33/4	3000	3000	750	380	470	420	4000	C	11.57
1/33/5	3000	3000	750	420	500	420	5000	C	12.86
1/34/3	3000	4000	1400	370	470	480	3000	C	12.17
1/34/4	3000	4000	1400	400	550	500	4000	C	13.68
1/34/5	3000	4000	1300	450	550	520	5000	C	14.65
1/43/3	4000	3000	500	470	550	420	3000	C	10.12
1/43/4	4000	3000	400	500	600	450	4000	C	11.42
1/43/5	4000	3000	300	570	670	500	5000	C	12.88
1/44/3	4000	4000	1000	470	600	550	3000	C	11.87
1/44/4	4000	4000	1000	500	600	550	4000	C	13.07
1/44/5	4000	4000	1000	500	650	550	5000	C	14.31
1/45/3	4000	5000	1600	450	600	630	3000	C	13.85
1/45/4	4000	5000	1600	500	650	650	4000	D	15.01
1/45/5	4000	5000	1500	550	700	700	5000	D	16.38
1/53/3	5000	3000	300	550	650	500	3000	C	10.11
1/53/4	5000	3000	300	620	700	520	4000	C	11.54
1/53/5	5000	3000	300	670	770	550	5000	C	12.98
1/54/3	5000	4000	800	550	700	530	3000	C	11.56
1/54/4	5000	4000	700	600	750	570	4000	C	12.90
1/54/5	5000	4000	650	650	800	600	5000	C	14.23
1/55/3	5000	5000	1400	550	750	650	3000	C	13.40
1/55/4	5000	5000	1200	600	780	700	4000	C	14.66
1/55/5	5000	5000	1200	650	820	730	5000	D	16.04

BOX CELL DESIGNATION No/ab/Ec	a (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	h (mm)	REQUIRED BEARING CAPACITY CATEGORY	DESIGN BASE PRESSURE (T/M²)
1/63/3	6000	3000	300	650	750	580	3000	C	10.39
1/63/4	6000	3000	300	750	850	630	4000	C	12.06
1/63/5	6000	3000	300	820	900	670	5000	C	13.51
1/64/3	6000	4000	400	700	800	580	3000	C	11.47
1/64/4	6000	4000	300	750	850	630	4000	C	12.80
1/64/5	6000	4000	300	800	950	700	5000	C	14.40
1/65/3	6000	5000	1000	650	850	680	3000	C	13.05
1/65/4	6000	5000	900	650	900	720	4000	C	14.39
1/65/5	6000	5000	850	770	1000	750	5000	D	15.93
1/66/3	6000	6000	1500	650	900	850	3000	C	14.87
1/66/4	6000	6000	1400	700	1000	880	4000	D	16.29
1/66/5	6000	6000	1250	750	1050	950	5000	D	17.58
1/75/3	7000	5000	700	750	1000	700	3000	C	12.97
1/75/4	7000	5000	500	850	1050	770	4000	C	14.35
1/75/5	7000	5000	400	920	1150	800	5000	D	15.82
1/76/3	7000	6000	1300	750	1100	800	3000	C	14.86
1/76/4	7000	6000	1100	820	1100	880	4000	D	16.06
1/76/5	7000	6000	1100	870	1150	900	5000	D	17.46
1/77/3	7000	7000	1700	750	1100	1000	3000	D	16.56
1/77/4	7000	7000	1600	820	1150	1050	4000	D	17.95
1/77/5	7000	7000	1500	900	1200	1100	5000	D	19.37
1/85/3	8000	5000	300	870	1100	750	3000	C	12.83
1/85/4	8000	5000	00	950	1200	850	4000	C	14.18
1/85/5	8000	5000	00	1100	1300	900	5000	D	16.00
1/86/3	8000	6000	800	850	1200	900	3000	C	14.55
1/86/4	8000	6000	700	950	1250	950	4000	D	15.99
1/86/5	8000	6000	600	1050	1300	1000	5000	D	17.44
1/87/3	8000	7000	1300	850	1200	1050	3000	D	16.19
1/87/4	8000	7000	1200	950	1350	1100	4000	D	17.90
1/87/5	8000	7000	1100	1050	1400	1150	5000	D	19.35

NOTES:

1. FOR GENERAL ARRANGEMENT,REFER DRAWING. NO. SD/103 (sheet 1 of 2).
2. FOR GENERAL NOTES, REFER DRG.NO. SD/101
3. SAFE BEARING CAPACITY REQUIRED FOR SOIL IS DIVIDED IN FOUR CATEGORIES AS SHOWN BELOW :

CATEAGORY	::	SAFE BEARING CAPACITY REQUIRED FOR SOIL
A	::	5 T/M²
B	::	10 T/M²
C	::	15 T/M²
D	::	20 T/M²

4. ALL CASES WITH EARTH CUSHION HEIGHTS OF 3m TO 5m ARE SAFE FOR DRAW DOWN CONDITION.
5. FOR EARTH CUSHION BETWEEN 3m AND 4m, BOX WITH 4m EARTH CUSHION IS TO BE USED AND FOR EARTH CUSHION BETWEEN 4m TO 5m, BOX WITH 5m EARTH CUSHION IS TO BE USED. NO RECOMMENDATION IS GIVEN FOR BOX CULVERT WITH EARTH CUSHION HEIGHT IN BETWEEN 0m TO 3m.
6. IN CASE ALLOWABLE SOIL BEARING CAPACITY IS LESS THAN ACTUAL BEARING PRESSURE, THE SOIL SHOULD BE STABILISED TO ACHIEVE SAME.
7. FOR DIMENSIONAL PARAMETERS REFER SECTION 2–2 OF DRAWING NO. SD/103 (SHEET 1 OF 2)

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

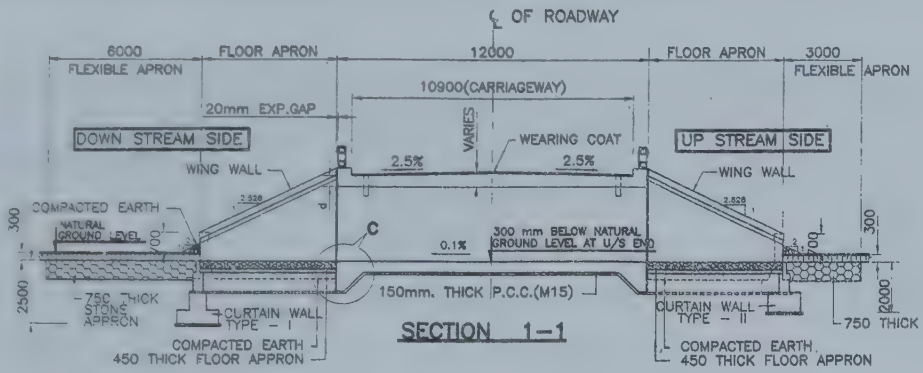
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL R.C.C BOX CULVERT
2m x 2m TO 8m x7m
(WITH EARTH CUSHION)

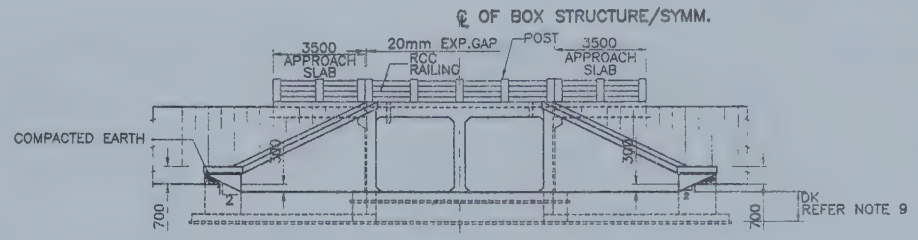
GENERAL ARRANGEMENT

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/103 (SHEET 2 OF 2)

DRG.NO. SD/104



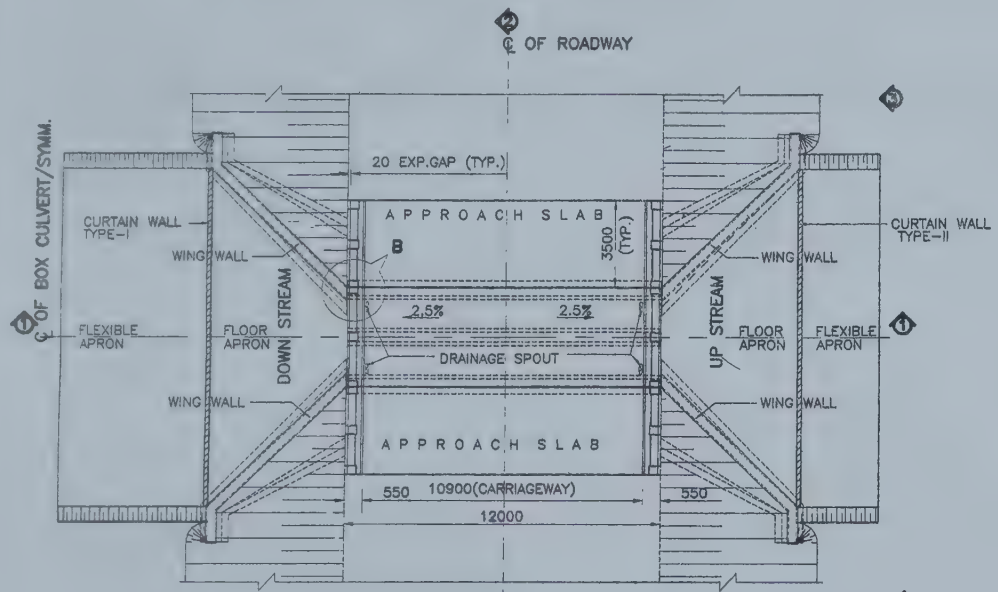
SECTION 1–1



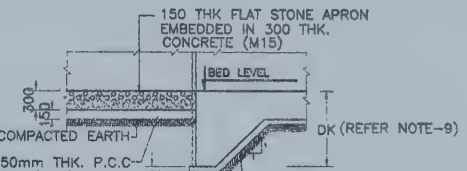
VIEW 3–3

TABLE SHOWING SALIENT DIMENSIONS

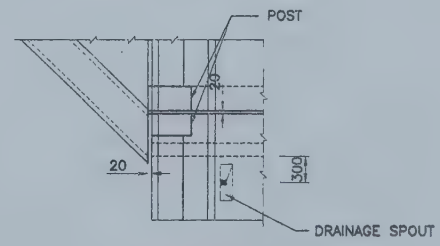
BOX CELL DESIGNATION Nc/ab/Ec	a (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	g (mm)	REQUIRED BEARING CAPACITY CATEGORY	DESIGN BASE PRESSURE (T/M²)	ALLOWABLE DRAWDOWN AT A TIME (M)
2/22/0	2000	2000	300	400	400	370	300	B	8.97	0.76
2/23/0	2000	3000	300	400	420	400	300	C	10.35	0.91
2/32/0	3000	2000	300	450	450	400	300	B	7.58	1.47
2/33/0	3000	3000	300	470	450	420	350	B	8.52	1.75



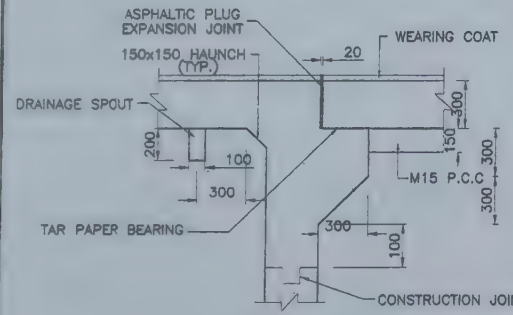
PLAN



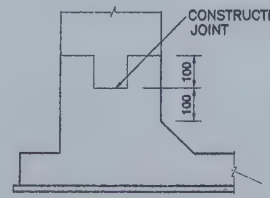
DETAIL – C



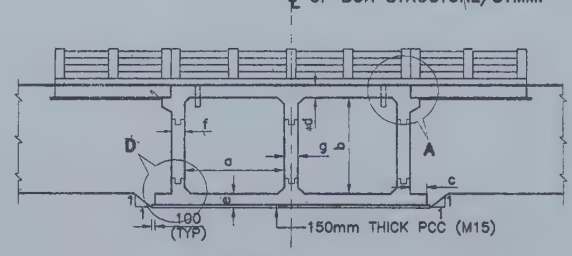
DETAIL – B



DETAIL – A



DETAIL D



SECTION 2–2

*d DECK SLAB THICKNESS AT INNER EDGE OF KERB AS SHOWN IN SECTION

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. FOR GENERAL NOTES AND REFERENCE DRAWINGS REFER DRG. NO. SD/101.
3. FOR REINFORCEMENT DETAILS REFER DRG. NO. SD/110.
4. FOR DETAILS OF WING WALL REFER DWG. NO. SD/113.
5. SOIL DENSITY ON THE BACKFILL SHOULD CONFORM TO CLAUSE 305.2.1.5 OF MOST SPECIFICATION.
6. NET BEARING CAPACITY REQUIRED FOR SOIL IS DIVIDED IN FOUR CATEGORIES AS SHOWN BELOW :

CATEGORY	::	NET BEARING CAPACITY REQUIRED FOR SOIL
A	::	5 T/M²
B	::	10 T/M²
C	::	15 T/M²
D	::	20 T/M²

7. SOFT AND LOOSE PATCHES IN THE BEARING AREA ARE TO BE REPLACED BY COMPACTED GRANULAR FILLS WITH LAYERS NOT EXCEEDING 300mm.
8. DESIGNS ARE GIVEN FOR THE BOX CELL STRUCTURES ONLY. THESE HAVE NO BEARING WITH THE DESIGN OF EMBANKMENT WHICH WILL BE TAKEN UP BY ENGINEER-IN-CHARGE SEPERATELY.
9. 'DK' IS DEPTH OF KEY AT BASE SLAB.

FOR BASE SLAB THICKNESS	VALUE OF 'DK'
UPTO 900mm	1200mm.
GREATER THAN 900mm	e+300mm

e = BASE SLAB THICKNESS

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

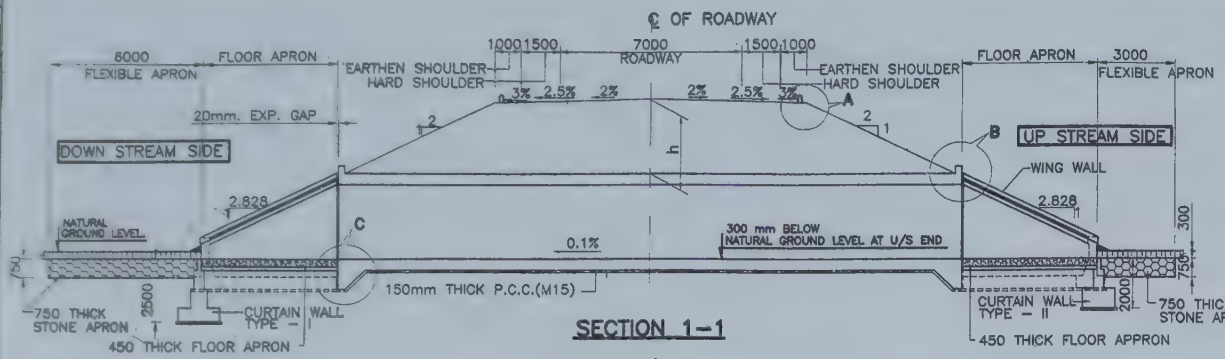
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DOUBLE CELL R.C.C BOX CULVERTS
2m x 2m TO 3m x3m
(WITHOUT EARTH CUSHION)

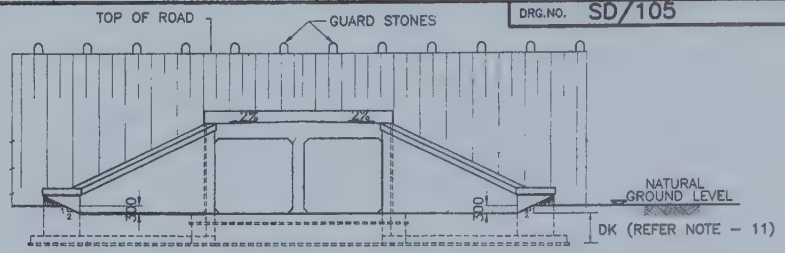
GENERAL ARRANGEMENT

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1 9 9 9
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/104

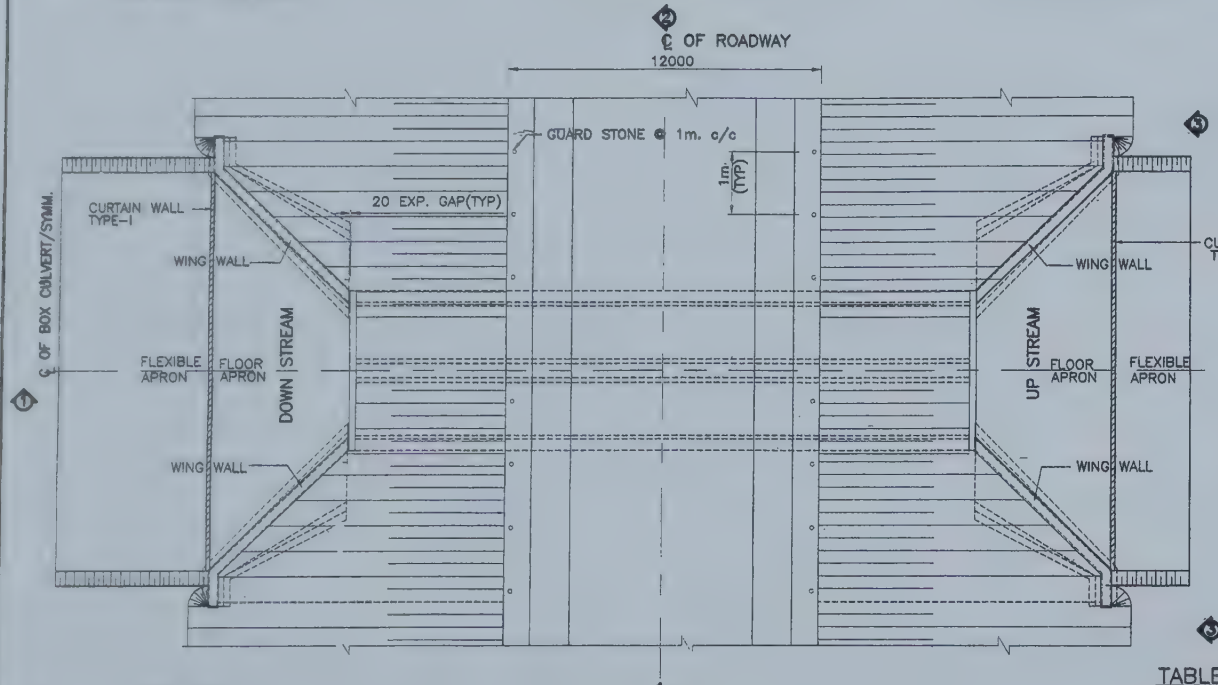
DRG.NO. SD/105



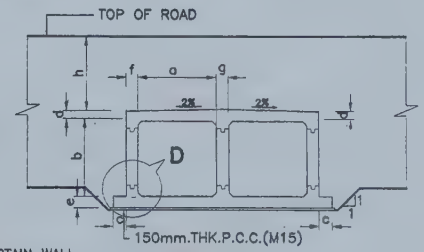
SECTION 1–1



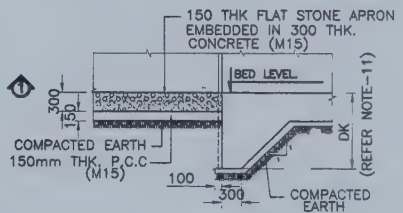
VIEW – 3–3



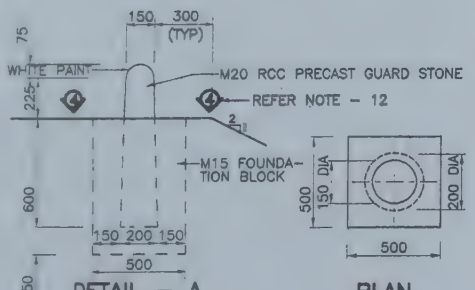
PLAN AT ROAD LEVEL



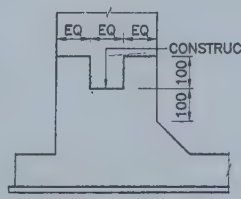
SECTION 2–2



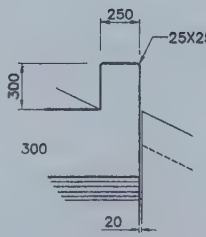
DETAIL – C



DETAIL OF PRECAST GUARD



DETAIL – D



DETAIL – B

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. FOR GENERAL NOTES AND REFERENCE DRAWINGS REFER DRG. NO. SD/101.
3. FOR REINFORCEMENT DETAILS REFER DRG. NO. SD/114.
4. FOR DETAILS OF WING WALL REFER DWG. NO. SD/113.
5. SOIL DENSITY ON THE BACKFILL AND EARTH CUSHION SHOULD CONFIRM TO CLAUSE 305.2.1.5 OF MOST SEPCIFICATION.
6. NET BEARING CAPACITY REQUIRED FOR SOIL IS DIVIDED IN FOUR CATEGORIES AS SHOWN BELOW :

CATEGORY	::	NET BEARING CAPACITY REQUIRED FOR SOIL
A	::	5 T/M^2
B	::	10 T/M^2
C	::	15 T/M^2
D	::	20 T/M^2

7. SOFT AND LOOSE PATCHES IN THE BEARING AREA ARE TO BE REPLACED BY COMPACTED GRANULAR FILLS WITH LAYERS NOT EXCEEDING 300mm.
8. DESIGNS ARE GIVEN FOR THE BOX CELL STRUCTURES ONLY. THESE HAVE NO BEARING WITH THE DESIGN OF EMBANKMENT WHICH WILL BE TAKEN UP BY ENGINEER–IN–CHARGE SEPERATELY.
9. ALL CASES WITH EARTH CUSHION OF 3m TO 5m HEIGHT ARE SAFE FOR SUDDEN DRAW DOWN CONDITION
10. FOR EARTH CUSHION BETWEEN 3m AND 4m, BOX WITH 4m EARTH CUSHION IS TO BE USED AND FOR EARTH CUSHION BETWEEN 4m TO 5m, BOX WITH 5m EARTH CUSHION IS TO BE USED. NO RECOMMENDATION IS GIVEN FOR BOX CULVERT WITH EARTH CUSHION BELOW 3m HEIGHT.
11. 'DK' IS DEPTH OF KEY AT BASE SLAB.

FOR BASE SLAB THICKNESS	VALUE OF 'DK'
UPTO 900mm	1200mm.
GREATER THAN 900mm	e+300mm

e = BASE SLAB THICKNESS

12. FOR SECTION 4–4 DETAILS REFER DR. NO. SD/114 (SHEET 1 OF 4).

TABLE SHOWING SALIENT DIMENSIONS

BOX CELL DESIGNATION No/ab/Ec	a (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	g (mm)	h (mm)	CATEGORY OF BEARING CAPACITY (T/m2)	DESIGN BASE PRESSURE (T/m2)
2/22/3	2000	2000	300	270	300	250	250	3000	B	7.70
2/22/4	2000	2000	300	300	350	250	250	4000	B	9.00
2/22/5	2000	2000	300	320	350	270	250	5000	C	10.16
2/23/3	2000	3000	500	300	350	350	250	3000	B	9.24
2/23/4	2000	3000	500	320	350	350	250	4000	C	10.41
2/23/5	2000	3000	400	350	350	380	250	5000	C	11.54
2/32/3	3000	2000	300	400	420	300	250	3000	B	7.97
2/32/4	3000	2000	300	450	470	300	250	4000	B	9.30
2/32/5	3000	2000	300	500	500	300	250	5000	C	10.46
2/33/3	3000	3000	300	400	420	350	250	3000	B	8.52
2/33/4	3000	3000	300	430	450	380	250	4000	B	9.80
2/33/5	3000	3000	300	480	480	400	250	5000	C	11.01

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

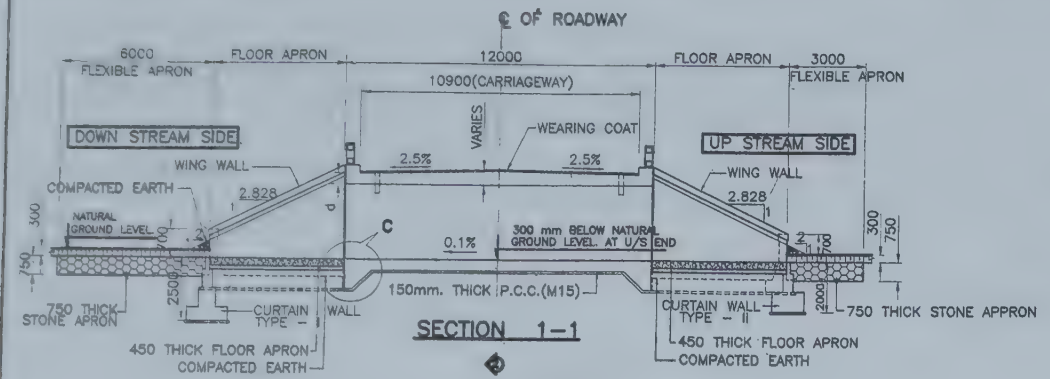
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DOUBLE CELL R.C.C BOX CULVERT
2m x 2m TO 3m x3m
(WITH EARTH CUSHION)

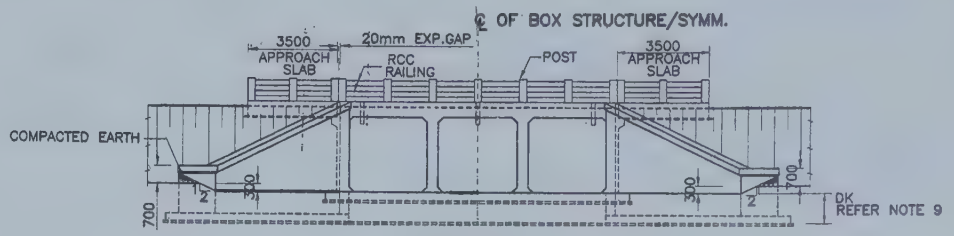
GENERAL ARRANGEMENT

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	SD/105

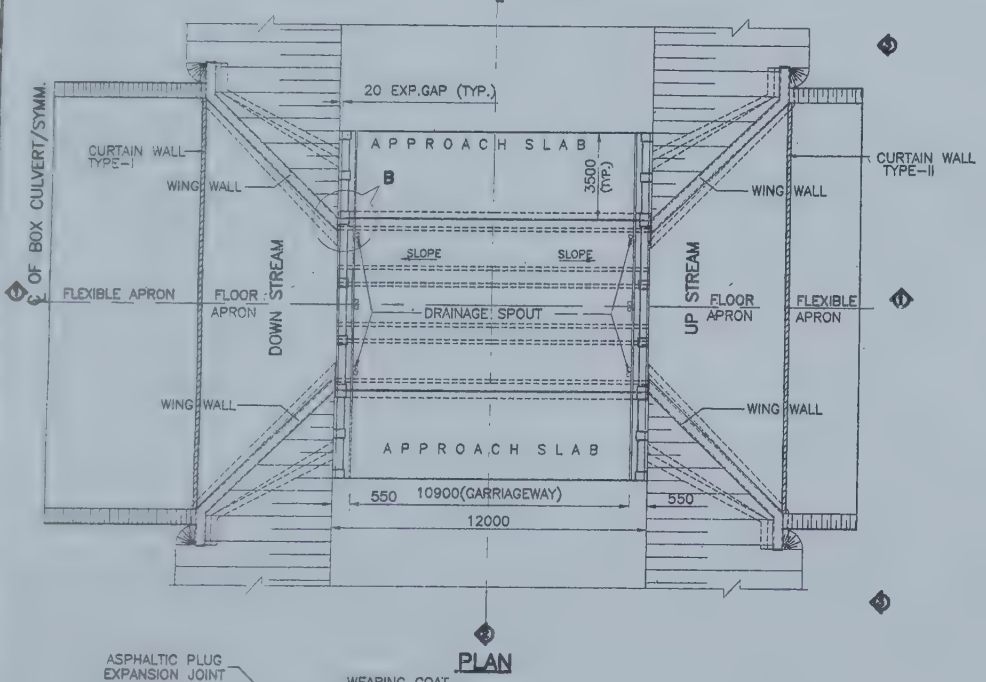
DRG.NO. SD/106



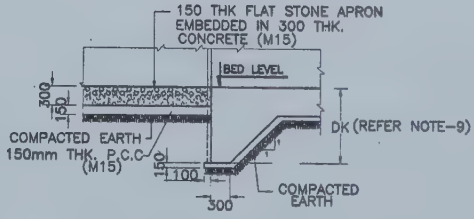
SECTION 1–1



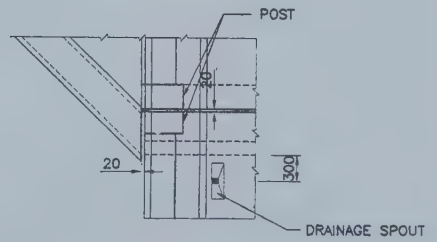
VIEW 3–3



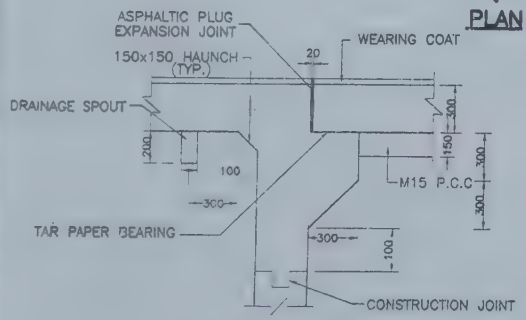
PLAN



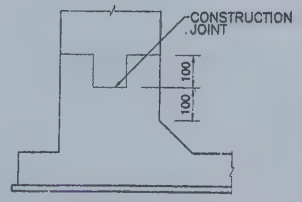
DETAIL – C



DETAIL – B

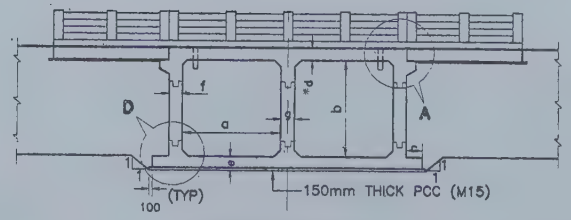


DETAIL – A



DETAIL D

℄ OF BOX STRUCTURE/SYMM.



SECTION 2–2

*d DECK SLAB THICKNESS AT INNER EDGE OF KERB AS SHOWN IN SECTION 1–1

TABLE SHOWING SALIENT DIMENSIONS

BOX CELL DESIGNATION H/c/ab/Ec	a (mm)	b (mm)	d (mm)	e (mm)	f (mm)	g (mm)	REQUIRED BEARING CAPACITY CATEGORY	DESIGN BASE PRESSURE (T/M²)	ALLOWABLE DRAWDOWN AT A TIME (M)
3/22/0	2000	2000	370	370	370	300	B	7.50	0.85
3/33/0	3000	3000	450	500	470	400	B	7.18	2.18

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. FOR GENERAL NOTES AND REFERENCE DRAWINGS REFER DRG. NO. SD/101.
3. FOR REINFORCEMENT DETAILS REFER DRG. NO. SD/112.
4. FOR DETAILS OF WING WALL REFER DWG. NO. SD/113.
5. SOIL DENSITY ON THE BACKFILL SHOULD CONFORM TO CLAUSE 305.2.1.5 OF MOST SPECIFICATION.
6. NET BEARING CAPACITY REQUIRED FOR SOIL IS DIVDED IN FOUR CATEGORIES AS SHOWN BELOW :

CATEGORY	::	NET BEARING CAPACITY REQUIRED FOR SOIL
A	::	5 T/M²
B	::	10 T/M²
C	::	15 T/M²
D	::	20 T/M²

7. SOFT AND LOOSE PATCHES IN THE BEARING AREA ARE TO BE REPLACED BY COMPACTED GRANULAR FILLS WITH LAYERS NOT EXCEEDING 300mm.
8. DESIGNS ARE GIVEN FOR THE BOX CELL STRUCTURES ONLY. THESE HAVE NO BEARING WITH THE DESIGN OF EMBANKMENT WHICH WILL BE TAKEN UP BY ENGINEER–IN–CHARGE SEPERATELY
9. 'DK' IS DEPTH OF KEY AT BASE SLAB.

FOR BASE SLAB THICKNESS	VALUE OF 'DK'
UPTO 900mm	1200mm.
GREATER THAN 900mm	e+300mm

e = BASE SLAB THICKNESS

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

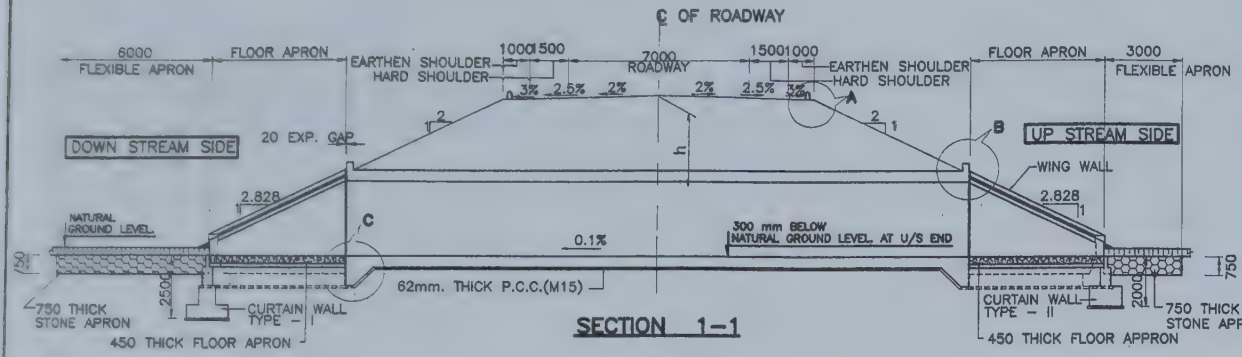
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

TRIPLE CELL R.C.C BOX CULVERTS
2m x 2m TO 3m x3m
(WITHOUT EARTH CUSHION)

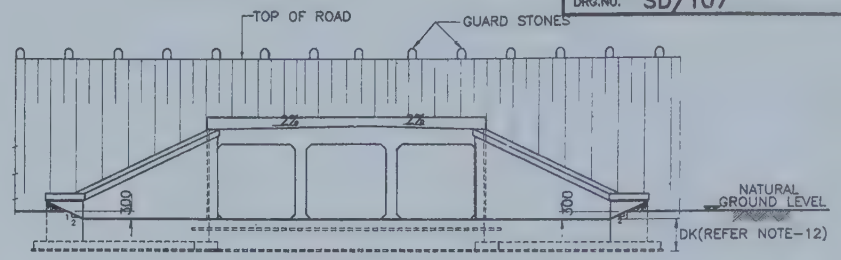
GENERAL ARRANGEMENT

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/106

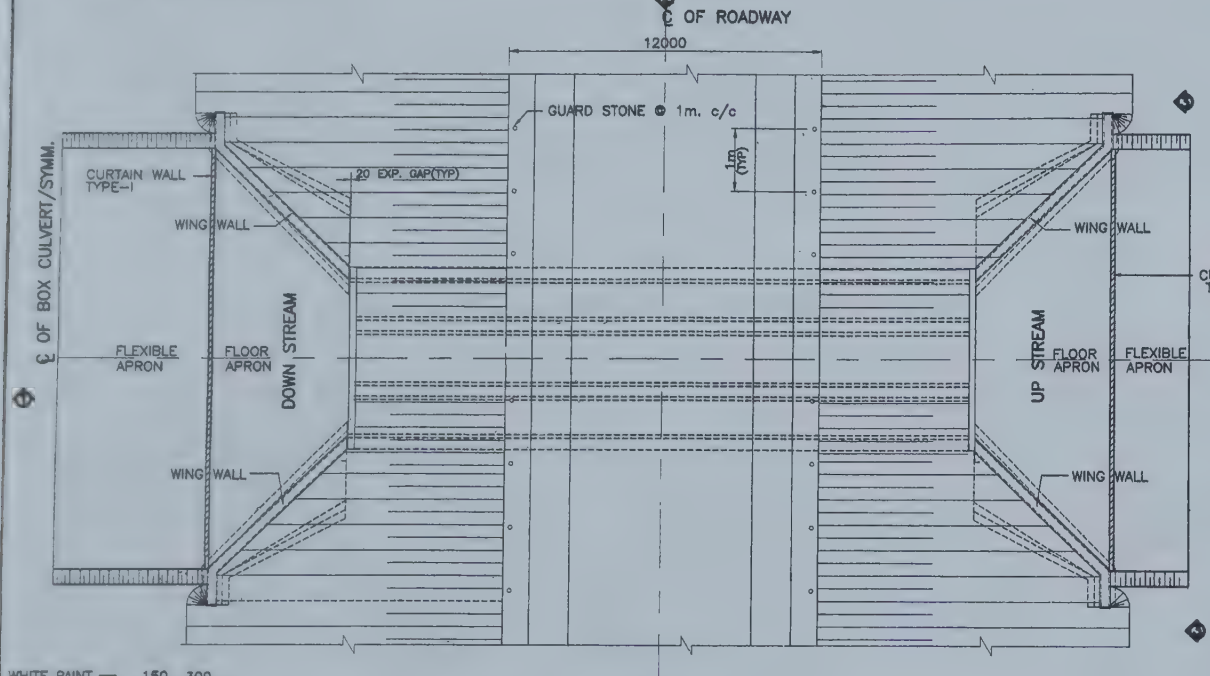
DRG.NO. SD/107



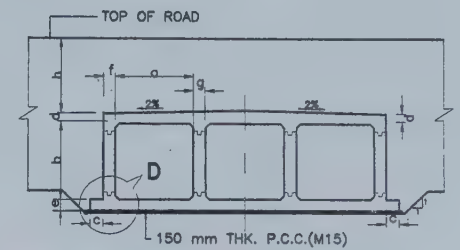
SECTION 1–1



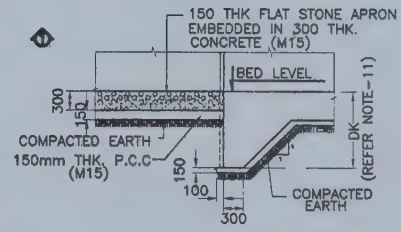
VIEW 3–3



PLAN AT ROAD LEVEL



SECTION 2–2



DETAIL – C

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED .ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. FOR GENERAL NOTES AND REFERENCE DRAWINGS REFER DRG. NO. SD/101.
3. FOR REINFORCEMENT DETAILS REFER DRG. NO. SD/116.
4. FOR DETAILS OF WING WALL REFER DWG. NO. SD/113. (SHEET 1 TO 5 OF 5)
5. SOIL DENSITY ON THE BACKFILL AND EARTH CUSHION SHOULD CONFIRM TO CLAUSE 305.2.1.5 OF MOST SEPCIFICATION.
6. NET BEARING CAPACITY REQUIRED FOR SOIL IS DIVIDED IN FOUR CATEGORIES AS SHOWN BELOW :

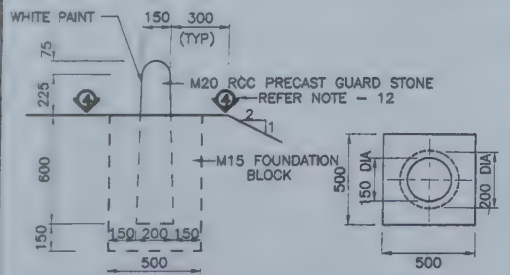
CATEGORY	::	NET BEARING CAPACITY REQUIRED FOR SOIL
A	::	5 T/M^2
B	::	10 T/M^2
C	::	15 T/M^2
D	::	20 T/M^2

7. SOFT AND LOOSE PATCHES IN THE BEARING AREA ARE TO BE REPLACED BY COMPACTED GRANULAR FILLS WITH LAYERS NOT EXCEEDING 300mm.
8. DESIGNS ARE GIVEN FOR THE BOX CELL STRUCTURES ONLY. THESE HAVE NO BEARING WITH THE DESIGN OF EMBANKMENT WHICH WILL BE TAKEN UP BY ENGINEER–IN–CHARGE SEPERATELY
9. ALL CASES WITH EARTH CUSHION OF 3m. TO 5m. HT. ARE SAFE FOR SUDDEN DRAW DOWN CONDITION
10. FOR EARTH CUSHION BETWEEN 3m AND 4m, BOX WITH 4m EARTH CUSHION IS TO BE USED AND FOR EARTH CUSHION BETWEEN 4m TO 5m, BOX WITH 5m EARTH CUSHION IS TO BE USED. NO RECOMMENDATION IS GIVEN FOR BOX CULVERT WITH EARTH CUSHION BELOW 3m HEIGHT.
11. 'DK' IS DEPTH OF KEY AT BASE SLAB.

FOR BASE SLAB THICKNESS	VALUE OF 'DK'
UPTO 900mm	1200mm.
GREATER THAN 900mm	e+300mm

e = BASE SLAB THICKNESS

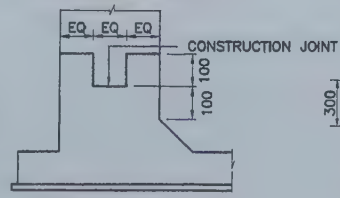
12. FOR SECTION 4–4 DETAILS REFER DRG NO.SD/116 (SHEET 1 OF 3)



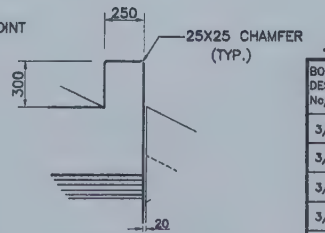
DETAIL – A

PLAN

DETAIL OF PRECAST GUARD STONE



DETAIL – D



DETAIL – B

TABLE SHOWING SALIENT DIMENSIONS

BOX CELL DESIGNATION No/ab/Ec	a (mm)	b (mm)	d (mm)	e (mm)	f (mm)	g (mm)	h (mm)	CATEGORY OF BEARING CAPACITY (T/m2)	DESIGN BASE PRESSURE (T/m2)
3/22/3	2000	2000	270	300	250	250	3000	B	7.43
3/22/4	2000	2000	300	320	300	250	4000	B	8.68
3/22/5	2000	2000	300	350	280	250	5000	B	9.82
3/33/3	3000	3000	350	400	350	250	3000	B	8.05
3/33/4	3000	3000	400	450	400	250	4000	B	9.40
3/33/5	3000	3000	450	480	420	250	5000	C	10.70

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

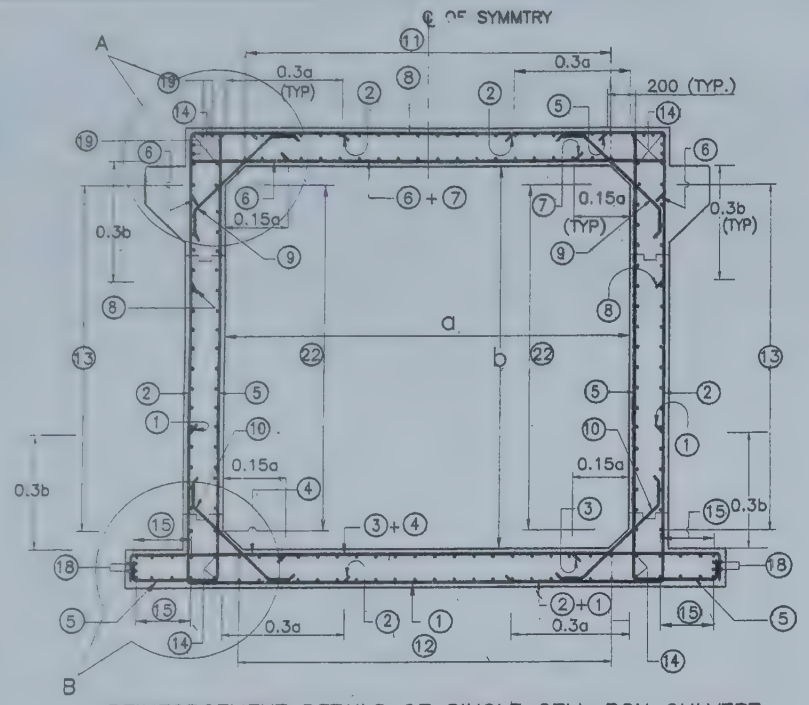
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

TRIPPLE CELL R.C.C BOX CULVERT
2m x 2m TO 3m x3m
(WITH EARTH CUSHION)

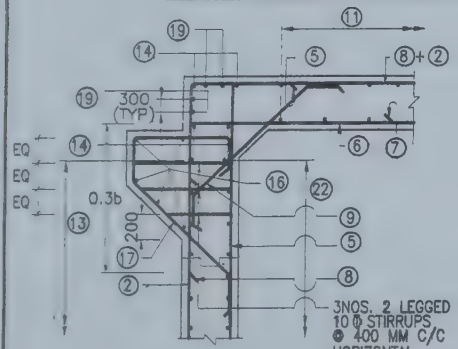
GENERAL ARRANGEMENT

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	SD/107

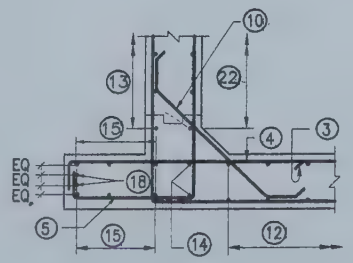
DRG.NO. SD/108 (SHEET 1 OF 6)



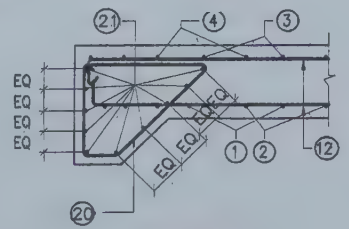
REINFORCEMENT DETAILS OF SINGLE CELL BOX CULVERT



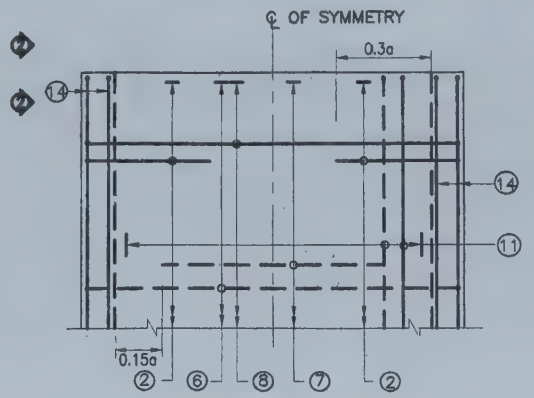
DETAIL– A



DETAIL–B

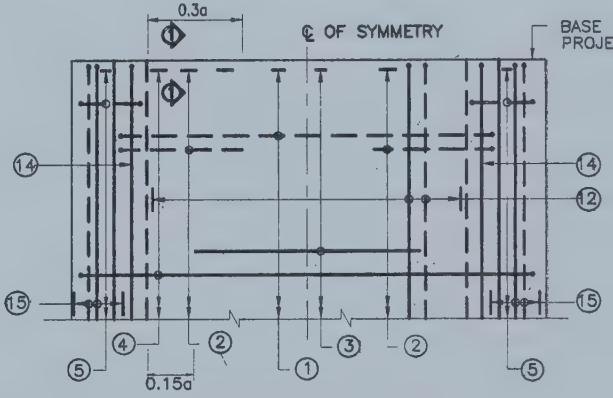


SECTION 1–1



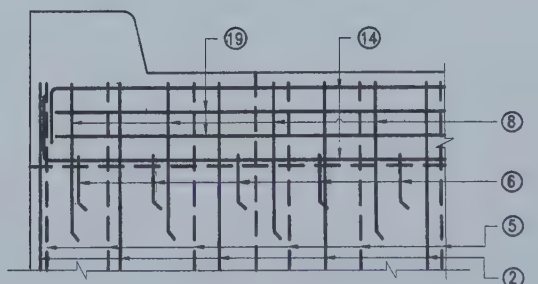
TOP SLAB R/F PLAN

(BAR MARK ⑤ ,⑲ KERB, BRACKET & HAUNCH LINES NOT SHOWN IN PLAN)



BOTTOM SLAB R/F PLAN

(HAUNCH LINES NOT SHOWN IN PLAN)



VIEW 2–2

(HAUNCH LINES NOT SHOWN)

NOTES:

1. FOR GENERAL NOTES REFER DRG. NO. SD/101.
2. FOR GENERAL ARRANGEMENT REFER DRG. NO. SD/102.
3. FOR BAR BENDING SCHEDULE REFER DRAWING NO. SD/108 (SHEET 2 TO 6 OF 6)
4. FOR LAP ZONES REFER DRAWING NO. SD/117 (SHEET 2 OF 2)

LEGEND :

: TOP FACE BARS/ OUTER FACE BARS

: BOTTOM FACE BARS/ INNER FACE BARS

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL R.C.C BOX CULVERTS
(WITHOUT EARTH CUSHION)
TYPICAL REINFORCEMENT DETAILS

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/108 (SHEET 1 OF 6)

SCHEDULE OF REINFORCEMENT

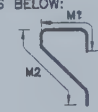
DRG.NO. SD/108 (SHEET 2 OF 6)

BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/22/0								1/23/0							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	10	250	930	2500	4328	49	212.0	130.7	16	225	1270	2600	5085	54	274.6	433.4
②	M1 M2 M1	16	250	850	2630	4275	100	427.5	674.8	16	225	900	3690	5435	112	608.7	960.5
③	M1	BAR IS NOT USED								BAR IS NOT USED							
④	M1 M2 M1	16	250	280	3500	4005	49	196.2	309.7	16	250	320	5200	5785	49	283.5	447.4
⑤	M1 0.2m. 0.2m. M2	16	250	2630	700	3645	98	357.6	564.2	16	175	3690	1550	5558	138	766.9	1210.5
⑥	M1 M2 M1	16	250	280	2500	2965	49	145.3	229.3	16	250	280	2600	3065	49	150.2	237.0
⑦	M1	BAR IS NOT USED								BAR IS NOT USED							
⑧	M2 M1 M1	10	250	900	2500	4266	49	209.0	128.9	16	225	1220	2600	4985	54	269.2	424.9
⑨	M1 M2 M1	10	250	200	890	1243	98	121.8	75.1	10	250	200	989	1342	98	131.5	81.1
⑩	M1 M2 M1	12	250	200	932	1291	98	126.5	112.3	12	250	200	1060	1418	98	139.0	123.4
⑪	M2 M1 M1	10	250	225	11900	12316	16	197.1	121.5	10	250	235	11900	12336	16	197.4	121.7
⑫	M2 M1 M1	10	250	190	11900	12246	16	195.9	120.8	10	150	210	11900	12286	26	319.4	196.9
⑬	M2 M1 M1	10	250	160	11900	12186	16	195.0	120.2	10	250	175	11900	12216	24	293.2	180.8
⑭	M2 M1 M1	10	–	160	11900	12186	12	146.2	90.2	10	–	160	11900	12186	12	146.2	90.2
⑮	M2 M1 M1	10	250	190	11900	12246	12	146.9	90.5	12	250	210	11900	12279	28	343.8	305.2
⑯	M1	12	–	11900	–	11900	10	119.0	105.7	12	–	11900	–	11900	10	119.0	105.7
⑰	M1 M2	12	250	1006	1268	2274	98	222.8	197.8	12	250	1006	1268	2274	98	222.8	197.8
⑱	M1 M1 M2	10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	12186	4	48.7	30.1
⑲	M1 M1 M2	10	–	160	11900	12186	8	97.5	60.1	10	–	160	11900	12186	8	97.5	60.1
⑳	M1 M1+0.2m 135° M2 0.2m.	10	150	1100	1556	4207	50	210.3	129.7	10	150	1100	1556	4207	72	302.9	186.8
㉑	M1 M1 M2	10	–	160	3500	3786	20	75.7	46.7	10	–	160	5200	5486	20	109.7	67.6
㉒	M1 M2 M1	10	250	160	11900	12186	16	195.0	120.2	10	250	175	11900	12216	24	293.2	180.8
TOTAL STEEL (Kgs)		3458								5642							
TOTAL CONCRETE (cum)		54								77							

BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/33/0								1/34/0							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	10	200	1270	3740	6246	61	381.0	234.9	12	225	1630	3820	7039	54	380.1	337.5
②	M1 M2 M1	16	200	1270	3740	6225	124	771.9	1218.3	16	225	1310	4830	7395	112	828.2	1307.3
③	M1	12	200	2100	–	2100	61	128.1	113.7	12	225	2100	–	2100	54	113.4	100.7
④	M1 M2 M1	16	200	320	5540	6125	61	373.6	589.7	16	225	380	7220	7925	54	428.0	675.5
⑤	M1 0.2m. 0.2m. M2	12	150	3740	1220	5298	162	858.3	762.0	16	175	4830	2060	7208	138	994.6	1569.9
⑥	M1 M2 M1	16	200	280	3740	4205	61	256.5	404.9	16	225	260	3820	4285	54	231.4	365.2
⑦	M1	BAR IS NOT USED								BAR IS NOT USED							
⑧	M2 M1 M1	10	200	1270	3740	6246	61	381.0	234.9	16	225	1600	3820	6965	54	376.1	593.6
⑨	M1 M2 M1	10	200	200	1158	1511	122	184.4	113.7	10	225	200	1257	1610	108	173.9	107.2
⑩	M1 M2 M1	10	200	200	1158	1524	122	185.9	114.6	10	225	200	1300	1666	108	179.9	110.9
⑪	M2 M1 M1	10	200	260	11900	12386	30	371.6	229.1	10	225	275	11900	12416	26	322.8	199.0
⑫	M2 M1 M1	12	200	210	11900	12279	30	368.4	327.0	12	225	240	11900	12339	26	320.8	284.8
⑬	M2 M1 M1	10	200	210	11900	12286	30	368.6	227.2	12	225	230	11900	12319	36	443.5	393.7
⑭	M2 M1 M1	10	–	160	11900	12186	12	146.2	90.2	10	–	160	11900	12186	12	146.2	90.2
⑮	M2 M1 M1	10	200	210	11900	12285	24	294.9	181.8	12	225	240	11900	12339	36	444.2	394.4
⑯	M1	12	–	11900	–	11900	10	119.0	105.7	12	–	11900	–	11900	10	119.0	105.7
⑰	M1 M2	12	200	1006	1268	2274	122	277.4	246.3	12	225	1006	1292	2298	108	248.1	220.3
⑱	M1 M1 M2	10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	12186	4	48.7	30.1
⑲	M1 M1 M2	10	–	160	11900	12186	8	97.5	60.1	10	–	160	11900	12186	8	97.5	60.1
⑳	M1 M1+0.2m 135° M2 0.2m.	10	200	1100	1556	4207	58	244.0	150.4	10	150	1100	1556	4207	100	420.7	259.4
㉑	M1 M1 M2	10	–	160	5540	5826	20	116.5	71.8	10	–	160	7220	7506	20	150.1	92.6
㉒	M1 M2 M1	10	250	210	11900	12286	24	294.9	181.8	10	250	230	11900	12326	32	394.4	243.2
TOTAL STEEL (Kgs)		5688								7541							
TOTAL CONCRETE (cum)		94								124							

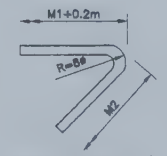
NOTES:

1. JOINT OR LAPPING OF BARS SHALL BE SUITABLY STAGGERED AS PER CLAUSE 304.6 OF IRC:21–1987.
2. FULL SCALE ELEVATION FOR THE BARS SHALL BE LINED OUT ON A PLAIN PLASTERED FLOOR TO THE DIMENSIONS SHOWN ON THE DRAWING SO AS TO GET CORRECT CLEARANCE BETWEEN DIFFERENT BARS AND THEN THE BARS SHALL BE BENT TO PROPER SHAPE.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING No. SD/108 (SHEET 1 OF 6).
4. QUANTITY OF CONCRETE DOES NOT INCLUDE RAILINGS.
5. QUANTITY OF STEEL DOES NOT INCLUDE 5% EXTRA FOR WASTAGE AND LAPS.
6. BAR No.17 IS DETAILED AS BELOW:

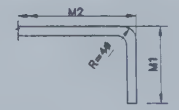


BENDING OF BARS

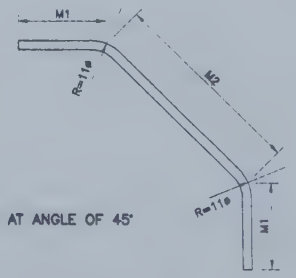
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL R.C.C BOX CULVERTS
2m x 2m TO 8m x7m
(WITHOUT EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/108 (SHEET 2 OF 6)

SCHEDULE OF REINFORCEMENT

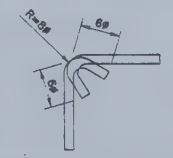
DRG.NO. SD/108 (SHEET 3 OF 6)

BAR MARK	SHAPE OF BARS (NOT TO SCALE) / BOX – CELL DESIGNATION Nc/ab/Ec	1/43/0								1/44/0								1/45/0								1/53/0							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	10	200	1350	4900	7586	61	461.5	284.5	12	200	1700	5000	8359	61	509.9	452.7	10	200	2070	5160	9286	61	565.2	348.5	12	200	1420	6040	8839	61	539.2	478.7
②	M1 M2 M1	20	200	1680	3850	7081	124	878.1	2165.5	20	200	1700	4930	8261	124	1024.4	2526.3	20	200	1780	6040	9531	124	1181.9	2914.7	20	200	2020	3970	7941	124	984.7	2428.5
③	M1	12	200	2800	–	2800	61	170.8	151.6	12	200	2800	–	2800	61	170.8	151.6	12	200	2800	–	2800	61	170.8	151.6	16	200	3500	–	3500	61	213.5	337.0
④	M2 M1 M1	16	200	400	5700	6445	61	393.1	620.5	16	200	450	7400	8245	61	502.9	793.8	16	200	520	8960	9945	61	606.6	957.5	16	200	470	6640	7525	61	459.0	724.5
⑤	0.2m. M1 0.2m. M2	12	175	3850	800	4988	138	688.4	611.1	12	150	4930	1650	6918	162	1120.7	995.0	12	150	6040	2430	8808	162	1426.9	1266.8	12	175	3970	770	5078	138	700.8	622.2
⑥	M2 M1 M1	16	200	260	4900	5365	61	327.3	516.5	16	200	260	5000	5465	61	333.4	526.2	20	200	320	5160	5731	61	349.8	862.2	16	200	260	6040	6505	61	396.8	626.3
⑦	M1	8	200	2800	–	2800	60	168.0	66.3	8	200	2800	–	2800	60	168.0	66.3	12	200	2800	–	2800	60	168.0	149.2	12	200	3500	–	3500	60	210.0	186.4
⑧	M2 M1 M1	10	200	1300	4900	7486	61	456.4	280.8	16	200	1630	5000	8205	61	500.5	790.0	12	200	1970	5160	9059	61	552.6	490.8	16	200	1350	6040	8685	61	529.8	836.2
⑨	M1 M2 M1	10	200	200	1314	1867	122	203.4	125.4	10	200	200	1427	1780	122	217.2	133.9	10	200	200	1597	1950	122	237.9	146.6	10	200	200	1484	1836	122	224.1	138.1
⑩	M1 M2 M1	10	200	200	1385	1750	122	213.5	131.7	10	200	200	1526	1892	122	230.8	142.3	12	200	200	1738	2097	122	255.8	227.1	10	200	200	1583	1948	122	237.7	146.6
⑪	M2 M1 M1	10	200	275	11900	12416	40	496.6	306.2	10	200	290	11900	12446	40	497.8	306.9	10	200	310	11900	12486	40	499.4	307.9	10	200	300	11900	12466	50	623.3	384.3
⑫	M2 M1 M1	12	200	250	11900	12399	40	494.4	438.9	12	200	275	11900	12409	40	496.4	440.7	12	175	310	11900	12479	46	574.0	509.6	12	200	285	11900	12429	50	621.4	551.7
⑬	M2 M1 M1	12	200	250	11900	12359	30	370.8	329.2	12	200	275	11900	12409	40	496.4	440.7	12	200	315	11900	12489	50	624.4	554.4	12	200	565.5	285	11900	12429	372.9	331.0
⑭	M2 M1 M1	10	–	160	11900	12186	12	146.2	90.2	10	–	160	11900	12186	12	146.2	90.2	10	–	160	11900	12186	12	146.2	90.2	8	–	128	11900	12129	12	145.5	57.4
⑮	M2 M1 M1	10	200	250	11900	12366	12	148.4	91.5	10	200	275	11900	12416	28	347.6	214.3	10	200	310	11900	12486	44	549.4	338.7	10	200	285	11900	12436	12	149.2	92.0
⑯	M1	12	–	11900	–	11900	10	119.0	105.7	12	–	11900	–	11900	10	119.0	105.7	12	–	11900	–	11900	10	119.0	105.7	12	–	11900	–	11900	10	119.0	105.7
⑰	M1 M2	12	200	1006	1348	2354	122	287.2	255.0	12	200	1006	1419	2425	122	295.8	262.6	12	200	1051	1532	2583	122	315.1	279.7	12	200	1008	1447	2453	122	299.3	265.7
⑱	M1 M1 M2	10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	12186	4	48.7	30.1
⑲	M1 M1 M2	10	–	160	11900	12186	8	97.5	60.1	10	–	160	11900	12186	8	97.5	60.1	10	–	160	11900	12186	8	97.5	60.1	10	–	160	11900	12186	8	97.5	60.1
⑳	M1+0.2m M1 M2 0.2m	10	150	1100	1556	4207	78	328.1	202.3	10	150	1100	1556	4207	102	429.1	264.6	10	150	1100	1556	4207	122	513.2	316.4	10	150	1100	1556	4207	92	387.0	238.6
㉑	M1 M1 M2	10	–	160	5700	5986	20	119.7	73.8	10	–	160	7400	7686	20	153.7	94.8	10	–	160	8960	9246	20	184.9	114.0	10	–	160	6640	6926	20	138.5	85.4
㉒	M1 M2 M1	10	250	250	11900	12366	24	296.8	183.0	10	230	275	11900	12416	36	447.0	275.6	10	200	315	11900	12496	50	624.8	385.2	10	220	285	11900	12436	28	348.2	214.7
TOTAL STEEL (Kgs)		7120								9164								10607								8941							
TOTAL CONCRETE (cum)		114								149								194								142							

NOTES:

1. FOR ALL NOTES REFER. DRG. NO. SD/108 (SHEET 2 OF 6)

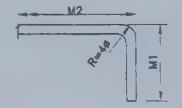
BENDING OF BARS

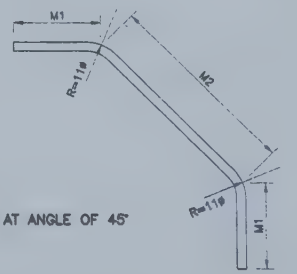


BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°

BEND AT RIGHT ANGLE





BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

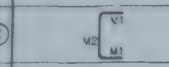
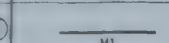
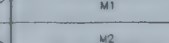
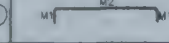
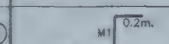
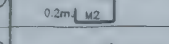
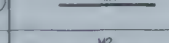
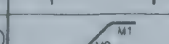
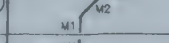
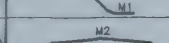
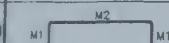
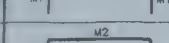
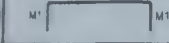
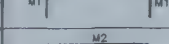
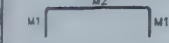
SINGLE CELL R.C.C BOX CULVERTS
2m x 2m TO 8m x7m
(WITHOUT EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/108 (SHEET 3 OF 6)

DRG.NO. SD/108 (SHEET 4 OF 6)

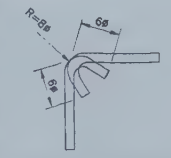
SCHEDULE OF REINFORCEMENT

BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/54/0								1/55/0								1/63/0								1/64/0							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①		20	200	1750	6140	9571	61	583.9	1439.9	16	200	2130	6300	10505	61	640.8	1011.4	16	200	1570	7340	10425	61	635.9	1003.7	20	200	1870	7400	11071	61	675.4	1665.5
②		16	200	2070	5020	9105	124	1129.0	1782.0	20	200	2150	6160	10391	124	1288.5	3177.7	20	200	2470	4300	9171	124	1137.2	2804.6	20	200	2500	5300	10231	124	1268.7	3128.8
③		16	200	3500	–	3500	61	213.5	337.0	16	200	3500	–	3500	61	213.5	337.0	20	200	4200	–	4200	61	256.2	631.8	20	200	4200	–	4200	61	256.2	631.8
④		16	200	500	7740	8685	61	529.8	836.2	25	200	580	9300	10374	61	632.8	2438.5	12	200	620	7940	9139	61	557.5	494.9	16	200	620	8000	9185	61	560.3	884.3
⑤		12	150	5020	1320	6678	162	1081.9	960.5	16	200	6160	2100	8578	122	1046.5	1651.7	12	150	4300	920	5558	162	900.4	799.4	12	150	5300	950	6588	162	1067.3	947.6
⑥		20	200	320	6140	6711	61	409.4	1009.6	20	200	320	6300	6871	61	419.2	1033.7	16	200	260	7340	7805	61	476.1	751.5	20	200	320	7400	7971	61	486.3	1199.2
⑦		12	200	3500	–	3500	60	210.0	186.4	BAR IS NOT USED								16	200	4200	–	4200	60	252.0	397.7	16	200	4200	–	4200	60	252.0	397.7
⑧		16	200	1670	6140	9425	61	574.9	907.4	16	200	2030	6300	10305	61	628.6	992.2	16	200	1530	7340	10345	61	631.0	996.0	16	200	1830	7400	11005	61	671.3	1059.6
⑨		10	200	200	1583	1935	122	236.1	145.6	10	200	200	1781	2133	122	260.3	160.5	10	200	200	1950	2303	122	281.0	173.2	10	200	200	1993	2346	122	286.2	176.4
⑩		10	200	200	1696	2061	122	251.5	155.1	10	200	200	1922	2288	122	279.1	172.1	10	200	200	2007	2373	122	289.5	178.5	10	200	200	2049	2415	122	294.6	181.6
⑪		10	150	310	11900	12486	66	824.1	508.1	10	200	340	11900	12546	50	627.3	386.7	10	150	390	11900	12646	78	986.4	608.1	10	150	390	11900	12646	78	986.4	608.1
⑫		10	125	300	11900	12466	78	972.3	599.5	10	125	340	11900	12546	78	978.6	603.3	10	125	360	11900	12586	94	1183.1	729.4	12	125	360	11900	12579	94	1182.4	1049.8
⑬		10	125	310	11900	12486	62	774.1	477.3	10	125	350	11900	12566	78	980.1	604.3	10	125	360	11900	12586	46	578.9	356.9	10	125	375	11900	12616	62	782.2	482.2
⑭		8	–	128	11900	12129	12	145.5	57.4	8	–	128	11900	12129	12	145.5	57.4	10	–	160	11900	12186	12	146.2	90.2	10	–	160	11900	12186	12	146.2	90.2
⑮		10	200	300	11900	12466	20	249.3	153.7	10	150	340	11900	12546	44	552.0	340.3	10	150	360	11900	12586	12	151.0	93.1	10	150	360	11900	12586	12	151.0	93.1
⑯		12	–	11900	–	11900	10	119.0	105.7	12	–	11900	–	11900	10	119.0	105.7	12	–	11900	–	11900	10	119.0	105.7	12	–	11900	–	11900	10	119.0	105.7
⑰		12	200	1041	1518	2559	122	312.1	277.1	12	200	1121	1631	2752	122	335.7	298.0	12	200	1141	1659	2800	122	341.6	303.3	12	200	1171	1702	2872	122	350.4	311.1
⑱		10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	4	12186	48.7	30.1
⑲		10	–	160	11900	12186	8	97.5	60.1	10	–	160	11900	12186	8	97.5	60.1	10	–	160	11900	12186	8	97.5	60.1	10	–	160	11900	8	12186	97.5	60.1
⑳		10	150	1100	1556	4207	106	445.9	274.9	10	150	1100	1556	4207	126	530.1	326.8	10	150	1100	1556	4207	108	454.4	280.1	10	150	1100	1556	4207	110	462.8	285.3
㉑		10	–	160	7740	8028	20	160.5	99.0	10	–	160	9300	9586	20	191.7	118.2	10	–	160	7940	8226	20	164.5	101.4	10	–	160	8000	8286	20	165.7	102.2
㉒		10	210	310	11900	12486	38	474.5	292.5	10	180	350	11900	12566	56	703.7	433.8	10	180	360	11900	12586	32	402.7	248.3	10	170	375	11900	12616	46	580.3	357.8
TOTAL STEEL (Kgs)		10695								14339								11238								13848							
TOTAL CONCRETE (cum)		174								224								201								222							

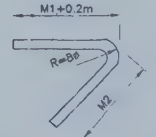
NOTES:

1. FOR ALL NOTES REFER. DRG. NO. SD/108 (SHEET 2 OF 6)

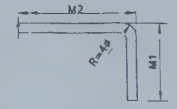
BENDING OF BARS



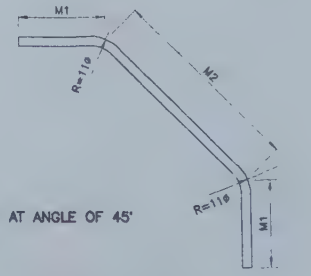
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL R.C.C BOX CULVERTS
2m x 2m TO 8m x7m
(WITHOUT EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/108 (SHEET 4 OF 6)

DRG.NO. SD/108 (SHEET 5 OF 6)

SCHEDULE OF REINFORCEMENT

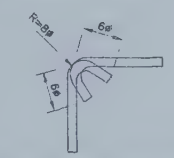
BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/65/0								1/66/0							
		BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	20	200	2200	7400	11731	61	715.6	1764.8	20	200	2550	7600	12631	61	770.5	1900.2
②	M2 M1 M1	20	200	2500	6330	11261	124	1396.4	3443.8	20	200	2600	7400	12531	124	1553.9	3832.1
③	M1	16	200	4200	–	4200	61	256.2	404.4	16	200	4200	–	4200	61	256.2	404.4
④	M1 M2 M1	20	200	650	9600	10831	61	660.7	1629.4	20	200	700	11200	12531	61	764.4	1885.2
⑤	M1 0.2m. 0.2m M2	12	125	6330	1750	8418	194	1633.1	1449.9	12	125	7400	2550	10288	194	1995.9	1772.0
⑥	M1 M2 M1	16	200	260	7400	7865	61	479.8	757.2	25	200	400	7600	8314	61	507.2	1954.3
⑦	M1	12	200	4200	–	4200	60	252.0	223.7	12	200	4200	–	4200	60	252.0	223.7
⑧	M1 M2 M1	10	200	2130	7400	11626	61	709.2	437.2	16	200	2450	7600	12445	61	759.1	1198.2
⑨	M1 M2 M1	10	200	200	1993	2346	122	286.2	176.4	10	200	200	2162	2515	122	306.9	189.2
⑩	M1 M2 M1	10	200	200	2092	2457	122	299.8	184.8	10	200	200	2304	2669	122	325.7	200.8
⑪	M2 M1 M1	10	150	390	11900	12646	78	986.4	608.1	10	150	400	11900	12666	78	987.9	609.1
⑫	M2 M1 M1	12	150	375	11900	12609	78	983.5	873.2	12	150	400	11900	12659	78	987.4	876.6
⑬	M2 M1 M1	12	150	375	11900	12609	66	832.2	738.8	12	150	425	11900	12709	78	991.3	880.1
⑭	M2 M1 M1	10	–	160	11900	12186	12	146.2	90.2	10	–	160	11900	12186	12	146.2	90.2
⑮	M2 M1 M1	10	150	375	11900	12616	36	454.2	280.0	10	150	400	11900	12666	52	658.6	406.1
⑯	M1	12	–	11900	–	11900	10	119.0	105.7	12	–	11900	–	11900	10	119.0	105.7
⑰	M1 M2	12	200	1171	1702	2872	122	350.4	311.1	12	200	1271	1843	3114	122	379.9	337.3
⑱	M1 M1 M2	10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	12186	4	48.7	30.1
⑲	M1 M1 M2	10	–	160	11900	12186	8	97.5	60.1	10	–	160	11900	12186	8	97.5	60.1
⑳	M1 M1+0.2m 1.5m 3.2m M2	10	150	1100	1556	4207	130	546.9	337.2	10	150	1100	1556	4207	152	639.5	394.3
㉑	M1 M1 M2	10	–	160	9600	9886	20	197.7	121.9	10	–	160	11200	11486	20	229.7	141.6
㉒	M2 M1 M1	10	170	375	11900	12616	58	731.7	451.1	12	220	425	11900	12709	54	686.3	609.3
TOTAL STEEL (Kgs)		14479								18100							
TOTAL CONCRETE (cum)		258								315							

BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/75/0								1/76/0							
		BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	20	200	2300	8600	13131	61	801.0	1975.4	25	200	2670	8800	14054	61	857.3	3303.5
②	M2 M1 M1	20	200	2900	6500	12231	124	1516.7	3740.4	20	200	3000	7600	13531	124	1677.9	4137.9
③	M1	10	200	4900	–	4900	61	298.9	737.1	20	200	4900	–	4900	61	298.9	737.1
④	M1 M2 M1	20	200	750	9800	11231	61	685.1	1889.6	20	200	820	11200	12771	61	779.1	1921.3
⑤	M1 0.2m. 0.2m M2	12	150	6500	1350	8188	162	1326.5	1177.7	12	125	7600	2050	9988	194	1937.7	1720.3
⑥	M1 M2 M1	20	200	320	8600	9171	61	559.5	1379.7	20	200	320	8800	9371	61	571.7	1409.8
⑦	M1	12	200	4900	–	4900	60	294.0	261.0	12	200	4900	–	4900	60	294.0	261.0
⑧	M1 M2 M1	16	200	2200	8600	12945	61	789.6	1246.3	16	200	2530	8800	13805	61	842.1	1329.1
⑨	M1 M2 M1	10	200	200	2233	2586	122	315.5	194.5	10	200	200	2417	2770	122	337.9	208.3
⑩	M1 M2 M1	10	200	200	2375	2740	122	334.3	206.1	10	200	200	2615	2981	122	363.6	224.2
⑪	M2 M1 M1	12	150	425	11900	12709	92	1169.2	1038.0	12	150	440	11900	12739	92	1172.0	1040.5
⑫	M2 M1 M1	12	125	425	11900	12709	110	1398.0	1241.1	12	125	460	11900	12779	110	1405.7	1248.0
⑬	M2 M1 M1	12	125	425	11900	12709	78	991.3	880.1	12	125	475	11900	12809	94	1204.0	1069.0
⑭	M2 M1 M1	10	–	160	11900	12186	12	146.2	90.2	10	–	160	11900	12186	12	146.2	90.2
⑮	M2 M1 M1	12	150	425	11900	12709	20	254.2	225.7	12	150	460	11900	12779	36	460.0	408.4
⑯	M1	12	–	11900	–	11900	10	119.0	105.7	12	–	11900	–	11900	10	119.0	105.7
⑰	M1 M2	12	200	1271	1843	3114	122	379.9	337.3	12	200	1371	1985	3355	122	409.3	363.4
⑱	M1 M1 M2	10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	4	12186	48.7	30.1
⑲	M1 M1 M2	10	–	160	11900	12186	8	97.5	60.1	10	–	160	11900	8	12186	97.5	60.1
⑳	M1 M1+0.2m 1.5m 3.2m M2	10	150	1100	1556	4207	134	563.7	347.6	10	150	1120	1584	4275	152	649.8	400.6
㉑	M1 M1 M2	10	–	160	9800	10086	20	201.7	124.4	10	–	160	11200	11486	20	229.7	141.6
㉒	M2 M1 M1	12	220	425	11900	12709	46	584.6	519.0	12	190	475	11900	12809	62	794.1	705.1
TOTAL STEEL (Kgs)		17607								20915							
TOTAL CONCRETE (cum)		301								365							

NOTES:

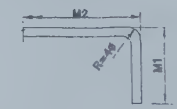
1. FOR ALL NOTES REFER. DRG. NO. SD/108 (SHEET 2 OF 6)

BENDING OF BARS

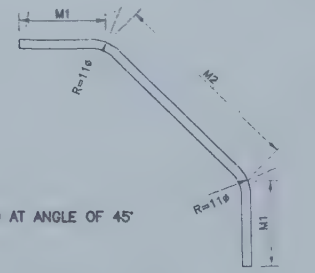


BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL R.C.C BOX CULVERTS
2m x 2m TO 8m x7m
(WITHOUT EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/108 (SHEET 5 OF 6)

DRG.NO. SD/108 (SHEET 6 OF 6)

SCHEDULE OF REINFORCEMENT

BAR MARK	SHAPE OF BARS (NOT TO SCALE)	BOX – CELL DESIGNATION Nc/ab/Ec	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
		1/77/0								
1	M1 M2 M1		16	200	3000	8800	14745	61	899.4	1419.6
2	M2 M1 M1		25	200	3000	8630	14544	124	1803.5	6949.5
3	M1		25	200	4900	–	4900	61	298.9	1151.8
4	M1 M2 M1		16	200	850	11400	13045	61	796.7	1256.0
5	0.2m. M1 0.2m M2		12	150	8630	2150	11118	162	1801.1	1599.1
6	M1 M2 M1		20	200	320	8800	9371	61	571.7	409.8
7	M1		16	200	4900	–	4900	60	294.0	464.0
8	M1 M2 M1		16	200	2830	8800	14405	61	878.7	1386.9
9	M1 M2 M1		10	200	200	2417	2770	122	337.9	208.3
10	M1 M2 M1		10	200	200	2657	3023	122	368.8	227.4
11	M2 M1 M1		12	150	440	11900	12739	92	1172.0	1040.5
12	M2 M1 M1		12	125	475	11900	12809	110	1409.0	1250.9
13	M2 M1 M1		12	125	475	11900	12809	110	1409.0	1250.9
14	M2 M1 M1		10	–	160	11900	12186	12	146.2	90.2
15	M2 M1 M1		12	150	475	11900	12809	40	512.4	454.9
16	M1		12	–	11900	–	11900	10	119.0	105.7
17	M1 M2		12	200	1371	1985	3355	122	409.3	363.4
18	M1 M1 M2		10	–	160	11900	12186	4	48.7	30.1
19	M1 M1 M2		10	–	160	11900	12186	8	97.5	60.1
20	M1+0.2m M1 M2 135° 0.2m.		10	150	1150	1626	4378	154	674.2	415.6
21	M1 M1 M2		10	–	160	11400	11686	20	233.7	144.1
22	M2 M1 M1		12	190	475	11900	12809	74	947.9	841.5
TOTAL STEEL (Kgs)									22120	
TOTAL CONCRETE (cum)									304	

BAR MARK	SHAPE OF BARS (NOT TO SCALE)	BOX – CELL DESIGNATION Nc/ab/Ec	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
		1/85/0								
1	M1 M2 M1		16	200	2400	9800	14545	61	887.2	1400.4
2	M2 M1 M1		25	200	3300	6650	13164	124	1632.4	6290.1
3	M1		25	200	5600	–	5600	61	341.6	1316.3
4	M1 M2 M1		16	200	850	10400	12045	61	734.7	1159.7
5	0.2m. M1 0.2m M2		12	150	6650	1150	8138	162	1318.4	1170.5
6	M1 M2 M1		20	200	320	9800	10371	61	632.7	1560.2
7	M1		16	200	5600	–	5600	60	336.0	530.3
8	M1 M2 M1		16	200	2250	9800	14245	61	868.9	1371.5
9	M1 M2 M1		10	200	200	2445	2798	122	341.4	210.5
10	M1 M2 M1		10	200	200	2657	3023	122	368.8	227.4
11	M2 M1 M1		12	150	450	11900	12759	106	1352.4	1200.7
12	M2 M1 M1		12	125	475	11900	12809	126	1613.9	1432.9
13	M2 M1 M1		12	125	475	11900	12809	78	999.1	887.0
14	M2 M1 M1		10	–	160	11900	12186	12	146.2	90.2
15	M2 M1 M1		12	150	475	11900	12809	12	153.7	136.5
16	M1		12	–	11900	–	11900	10	119.0	105.7
17	M1 M2		12	200	1371	1985	3355	122	409.3	363.4
18	M1 M1 M2		10	–	160	11900	12186	4	48.7	30.1
19	M1 M1 M2		10	–	160	11900	12186	8	97.5	60.1
20	M1+0.2m M1 M2 135° 0.2m.		10	150	1150	1626	4378	142	621.6	383.3
21	M1 M1 M2		10	–	160	10400	10686	20	213.7	131.8
22	M2 M1 M1		12	190	475	11900	12809	52	666.1	591.3
TOTAL STEEL (Kgs)									20650	
TOTAL CONCRETE (cum)									350	

BAR MARK	SHAPE OF BARS (NOT TO SCALE)	BOX – CELL DESIGNATION Nc/ab/Ec	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
		1/86/0								
1	M1 M2 M1		20	200	2720	9900	15271	61	931.6	2297.4
2	M2 M1 M1		25	200	3350	7690	14304	124	1773.7	6834.8
3	M1		25	200	5600	–	5600	61	341.6	1316.3
4	M1 M2 M1		16	200	870	11700	13385	61	816.5	1288.7
5	0.2m. M1 0.2m M2		12	150	7690	1800	9828	162	1592.2	1413.6
6	M1 M2 M1		20	200	320	9900	10471	61	638.8	1575.3
7	M1		12	200	5600	–	5600	60	336.0	298.3
8	M1 M2 M1		16	200	2570	9900	14985	61	914.1	1442.7
9	M1 M2 M1		10	200	200	2544	2897	122	353.4	217.9
10	M1 M2 M1		10	200	200	2756	3122	122	380.9	234.8
11	M2 M1 M1		12	150	460	11900	12779	106	1354.8	1202.6
12	M2 M1 M1		12	100	485	11900	12829	156	2001.3	1776.8
13	M2 M1 M1		12	100	1131.0	11900	12859	116	1491.6	1324.3
14	M2 M1 M1		10	–	160	11900	12186	12	146.2	90.2
15	M2 M1 M1		12	150	485	11900	12829	28	359.2	318.9
16	M1		12	–	11900	–	11900	10	119.0	105.7
17	M1 M2		12	200	1421	2055	3476	122	424.1	376.5
18	M1 M1 M2		10	–	160	11900	12186	4	48.7	30.1
19	M1 M1 M2		10	–	160	11900	12186	8	97.5	60.1
20	M1+0.2m M1 M2 135° 0.2m.		10	150	1170	1655	4446	158	702.5	433.1
21	M1 M1 M2		10	–	160	11700	11986	20	239.7	147.8
22	M2 M1 M1		12	180	500	11900	12859	66	848.7	753.5
TOTAL STEEL (Kgs)									23539	
TOTAL CONCRETE (cum)									478	

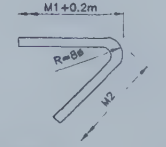
BAR MARK	SHAPE OF BARS (NOT TO SCALE)	BOX – CELL DESIGNATION Nc/ab/Ec	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
		1/87/0								
1	M1 M2 M1		25	200	3150	10300	16514	61	1007.4	3881.7
2	M2 M1 M1		25	200	3550	8850	15864	124	1967.2	7580.2
3	M1		25	200	5600	–	5600	61	341.6	1316.3
4	M1 M2 M1		16	200	1000	12900	14845	61	905.5	1429.3
5	0.2m. M1 0.2m M2		12	150	8850	2400	11588	162	1877.3	1666.7
6	M1 M2 M1		20	200	320	10300	10871	61	663.2	1635.4
7	M1		12	200	5600	–	5600	60	336.0	298.3
8	M1 M2 M1		18	200	2900	10300	16045	61	978.7	1544.8
9	M1 M2 M1		10	200	200	2869	3222	122	393.1	242.4
10	M1 M2 M1		10	200	200	3223	3589	122	437.8	269.9
11	M2 M1 M1		12	150	475	11900	12809	106	1357.7	1205.4
12	M2 M1 M1		12	100	550	11900	12959	156	2021.6	1794.8
13	M2 M1 M1		12	100	600	11900	13059	138	1776.0	1576.8
14	M2 M1 M1		10	–	160	11900	12186	12	146.2	90.2
15	M2 M1 M1		12	150	550	11900	12959	40	518.4	460.2
16	M1		12	–	11900	–	11900	10	119.0	105.7
17	M1 M2		12	200	1621	2338	3959	122	483.0	428.8
18	M1 M1 M2		10	–	160	11900	12186	4	48.7	30.1
19	M1 M1 M2		10	–	160	11900	12186	8	97.5	60.1
20	M1+0.2m M1 M2 135° 0.2m.		10	150	1300	1838	4890	174	850.8	524.6
21	M1 M1 M2		10	–	160	12900	13186	20	263.7	162.6
22	M2 M1 M1		12	150	600	11900	13059	92	1201.4	1066.6
TOTAL STEEL (Kgs)									27371	
TOTAL CONCRETE (cum)									502	

NOTES:

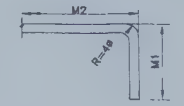
1. FOR ALL NOTES REFER. DRG. NO. SD/108 (SHEET 2 OF 6)

BENDING OF BARS

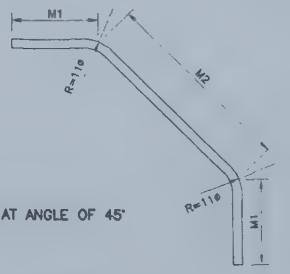
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

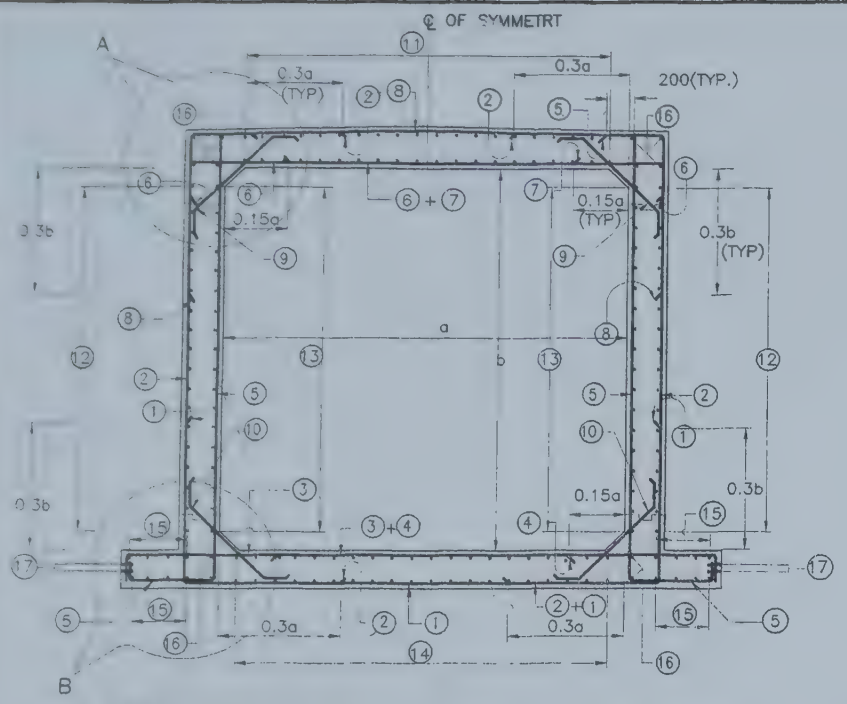
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL R.C.C BOX CULVERTS
2m x 2m TO 8m x7m
(WITHOUT EARTH CUSHION)

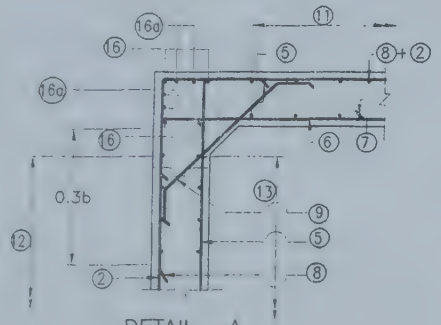
BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/108 (SHEET 6 OF 6)

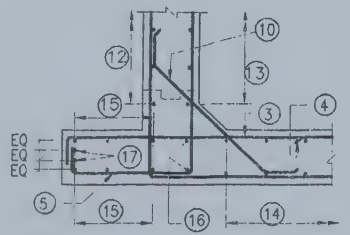
DRG.NO. SD/109 (SHEET 1 OF 16)



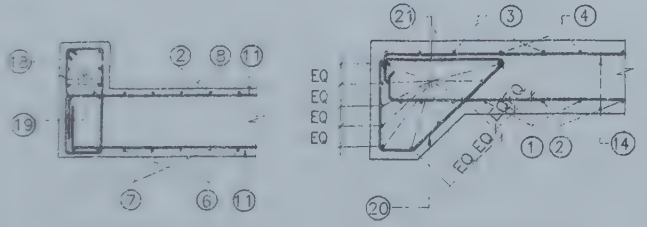
REINFORCEMENT DETAILS OF SINGLE CELL BOX CULVERT



DETAIL– A



DETAIL–B



SECTION 1–1

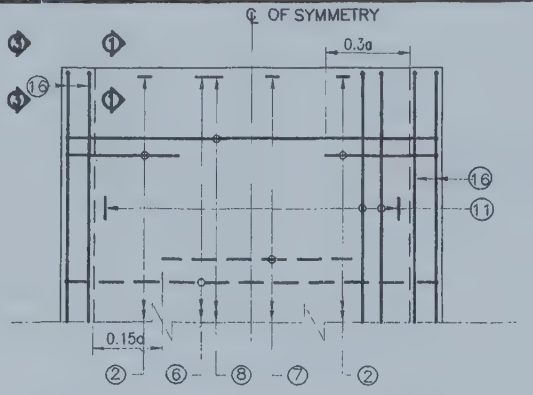
SECTION 2–2

SECTION 4–4

SECTION 5–5

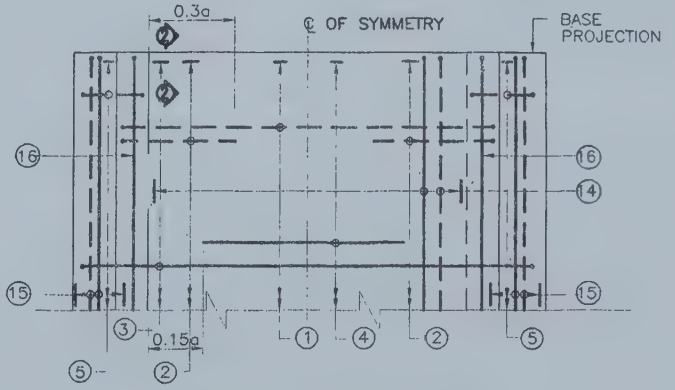
R/F DETAILS OF PRECAST GUARD STONE

(FOR LOCATION REFER DWG NO. SD/103 (SHEET 1 OF 2))



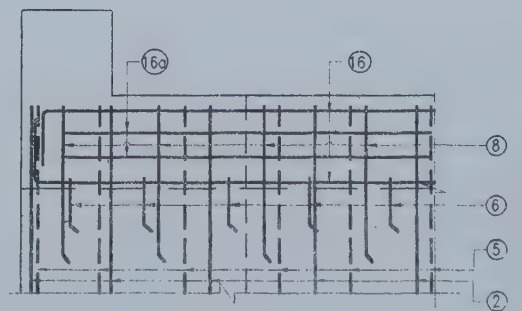
TOP SLAB R/F PLAN

(BAR MARK ⑤, ⑯a KERB & HAUNCH LINES NOT SHOWN IN PLAN)



BOTTOM SLAB R/F PLAN

(HAUNCH LINES NOT SHOWN IN PLAN)



VIEW 3–3

(HAUNCH LINES NOT SHOWN)

NOTES:

1. FOR GENERAL NOTES REFER DRG. NO. SD/101.
2. FOR GENERAL ARRANGEMENT REFER DRG. NO. SD/103 (SHEET 1 OF 2).
3. FOR BAR BENDING SCHEDULE REFER DRG. NO. SD/109 (SHEET 2 TO 16 OF 16)
4. FOR LAP ZONES REFER DRG. NO SD/117 (SHEET 1 OF 2)
5. FOR DIMENSION SCHEDULE OF BOX–CULVERT REFER DRG. NO SD/103 (SHEET 2 OF 2)
6. BAR ⑯a IS NOT SHOWN IN THE BAR BENDING SCHEDULE. THE NO OF ⑯a BAR SHOULD BE DECIDED AT SITE BY ENGINEER–IN–CHARGE DEPENDING ON WALL/ TOP SLAB THICKNESS AS PER MENTIONED SPACING IN DETAIL–A.

LEGEND:

——— : TOP FACE BARS/ OUTER FACE BARS

– – – – : BOTTOM FACE BARS/ INNER FACE BARS

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERTS (WITH EARTH CUSHION)

TYPICAL REINFORCEMENT DETAILS

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 1 OF 16)

DRG.NO. SD/109 (SHEET 2 OF 16)

SCHEDULE OF REINFORCEMENT

BAR MARK	SHAPE OF BARS (NOT TO SCALE) / BOX – CELL DESIGNATION Nc/ab/Ec	1/22/3								1/23/3							
		BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	10	200	850	2400	4066	121	491.9	303.3	12	200	1150	2600	4859	121	587.9	522.0
②	M1 M2 M1	10	200	800	2450	4016	244	979.8	604.1	12	200	900	3480	5239	244	1278.3	1134.9
③	M1 M2 M1	12	125	200	3600	3959	192	760.1	674.8	12	130	200	4800	5159	185	954.4	847.3
④	M1	BAR IS NOT USED								BAR IS NOT USED							
⑤	0.2m M1 0.2m M2	10	200	2450	750	3548	242	858.7	529.4	10	200	3480	1350	5178	242	1253.2	772.6
⑥	M1 M2 M1	10	100	160	2400	2686	240	644.6	397.4	12	180	200	2800	2959	134	396.5	352.0
⑦	M1	BAR IS NOT USED								BAR IS NOT USED							
⑧	M1 M2 M1	10	200	800	2400	3966	121	479.8	295.8	12	200	1130	2600	4819	121	583.1	517.7
⑨	M1 M2 M1	10	200	200	678	1031	242	249.4	153.8	10	200	200	862	1214	242	293.9	181.2
⑩	M1 M2 M1	10	200	200	748	1114	242	269.6	166.2	10	200	200	890	1255	242	303.8	187.3
⑪	M1 M2 M1	10	250	160	23848	24134	16	386.1	238.1	10	250	160	23848	24134	16	386.1	238.1
⑫	M1 M2 M1	10	250	160	23848	24134	16	386.1	238.1	10	250	180	23848	24174	24	580.2	357.7
⑬	M1 M2 M1	10	250	160	23848	24134	16	386.1	238.1	10	250	180	23848	24174	24	580.2	357.7
⑭	M1 M2 M1	10	250	160	23848	24134	16	386.1	238.1	10	250	160	23848	24134	16	386.1	238.1
⑮	M1 M2 M1	10	250	160	23848	24134	16	386.1	238.1	10	250	160	23848	24134	24	579.2	357.1
⑯	M1 M2 M1	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6
⑰	M1 M2 M1	BAR IS NOT USED								BAR IS NOT USED							
⑱	M1 M2	10	150	150	450	1231	34	41.9	25.8	10	150	150	480	1291	38	49.1	30.3
⑲	M1 M2 M1	10	–	160	2400	2686	16	43.0	26.5	10	–	160	2600	2886	16	46.2	28.5
⑳	M1+0.2m M1 M2 0.2m	10	150	1100	1556	4172	34	141.8	87.5	10	150	1100	1556	4172	38	158.5	97.7
㉑	M1 M2 M1	12	–	200	2400	2759	20	55.2	49.0	12	–	200	2600	2959	20	59.2	52.5
TOTAL STEEL (Kgs)		4682.5								6451.1							
TOTAL CONCRETE (cum)		72.69								112.57							

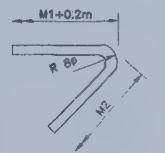
BAR MARK	SHAPE OF BARS (NOT TO SCALE) / BOX – CELL DESIGNATION Nc/ab/Ec	1/33/3								1/34/3							
		BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	12	200	1300	3700	6259	121	757.3	672.4	16	260	1620	3860	7045	93	655.2	1034.1
②	M1 M2 M1	12	200	1250	3720	6179	244	1507.6	1338.5	16	260	1330	4740	7345	190	1395.6	2202.7
③	M1 M2 M1	16	150	350	5300	5845	160	951.2	1501.3	16	130	370	6660	7345	185	1358.8	2144.7
④	M1	BAR IS NOT USED								BAR IS NOT USED							
⑤	0.2m M1 0.2m M2	10	250	3720	1100	5168	194	1002.7	618.2	10	200	4740	1780	6868	242	1662.2	1024.8
⑥	M1 M2 M1	16	180	280	3700	4165	134	558.1	880.9	16	280	260	3860	4325	87	376.3	593.9
⑦	M1	BAR IS NOT USED								10	280	2100	–	2100	86	180.6	111.3
⑧	M1 M2 M1	12	200	1220	3700	6099	121	738.0	655.2	16	260	1520	3860	6845	93	636.6	1004.8
⑨	M1 M2 M1	10	200	200	1060	1412	242	341.8	210.7	10	260	200	1873	1525	186	283.7	174.9
⑩	M1 M2 M1	10	200	200	1173	1538	242	372.3	229.5	10	260	200	1314	1680	186	312.4	192.6
⑪	M1 M2 M1	10	250	190	23848	24194	24	580.6	358.0	10	250	190	23848	24194	24	580.6	358.0
⑫	M1 M2 M1	10	250	200	23848	24214	24	581.1	358.3	10	250	240	23848	24294	32	777.4	479.3
⑬	M1 M2 M1	10	250	200	23848	24214	24	581.1	358.3	10	250	240	23848	24294	32	777.4	479.3
⑭	M1 M2 M1	10	250	230	23848	24274	24	582.6	359.2	10	250	240	23848	24294	24	583.0	359.5
⑮	M1 M2 M1	10	250	230	23848	24274	20	485.5	299.3	10	250	240	23848	24294	28	680.2	419.4
⑯	M1 M2 M1	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6
⑰	M1 M2 M1	10	–	160	23848	24134	2	48.3	29.8	10	–	160	23848	24134	2	48.3	29.8
⑱	M1 M2	10	150	150	570	1471	52	76.5	47.2	10	150	150	570	1471	54	79.5	49.0
⑲	M1 M2 M1	10	–	160	3700	3986	16	63.8	39.3	10	–	160	3860	4146	16	66.3	40.9
⑳	M1+0.2m M1 M2 0.2m	10	150	1100	1556	4172	52	216.9	133.8	10	150	1100	1556	4172	54	225.3	138.9
㉑	M1 M2 M1	12	–	200	3700	4059	20	81.2	72.1	12	–	200	3860	4219	20	84.4	74.9
TOTAL STEEL (Kgs)		8340.4								11091.3							
TOTAL CONCRETE (cum)		158.18								213.25							

NOTES:

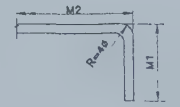
1. JOINT OR LAPPING OF BARS SHALL BE SUITABLY STAGGERED AS PER CLAUSE 304.6 OF IRC:21-1987
2. FULL SCALE ELEVATION FOR THE BARS SHALL BE LINED OUT ON A PLAIN PLASTERED FLOOR TO THE DIMENSIONS SHOWN ON THE DRAWING SO AS TO GET CORRECT CLEARANCE BETWEEN DIFFERENT BARS AND THEN THE BARS SHALL BE BENT TO PROPER SHAPE.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING No. SD/109 (SHEET 1 OF 16).
4. QUANTITY OF CONCRETE DOES NOT INCLUDE GUARD STONES.
5. QUANTITY OF STEEL DOES NOT INCLUDE 5% EXTRA FOR WASTAGE AND LAPS.

BENDING OF BARS

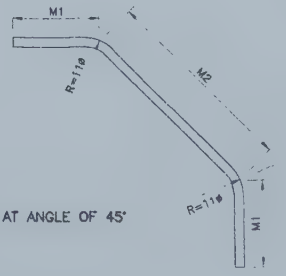
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)
BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 2 OF 16)

DRG.NO. SD/109 (SHEET 3 OF 16)

SCHEDULE OF REINFORCEMENT

BAR MARK / BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)

	1/43/3								1/44/3							
	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	12	240	1400	4740	7499	101	757.4	672.4	16	250	1750	5000	8445	97	819.2	1292.9
②	16	240	1570	3920	7005	204	1429.0	2255.5	16	250	1700	4970	8315	196	1629.8	2572.3
③	20	200	450	5740	6571	121	795.1	1960.9	25	260	500	7000	7914	93	736.0	2836.1
④	10	200	2800	–	2800	120	336.0	207.2	BAR IS NOT USED							
⑤	10	200	3920	820	5068	242	1231.4	759.2	10	200	4970	1450	6758	242	1638.0	1009.9
⑥	20	220	320	4740	5311	110	584.2	1440.8	16	140	260	5000	5465	172	940.0	1483.6
⑦	10	220	2800	–	2800	109	305.2	188.2	BAR IS NOT USED							
⑧	12	240	1320	4740	7339	101	741.2	658.1	16	250	1620	5000	8185	97	794.0	1253.1
⑨	10	240	200	1229	1582	202	319.6	197.0	10	250	200	1413	1766	194	342.6	211.2
⑩	10	240	200	1342	1708	202	345.0	212.7	10	250	200	1597	1962	194	380.7	234.7
⑪	10	200	240	23848	24294	40	971.7	599.1	10	200	240	23848	24294	40	971.7	599.1
⑫	10	200	210	23848	24234	30	727.0	448.2	10	200	280	23848	24374	40	974.9	601.1
⑬	10	250	210	23848	24234	24	581.6	358.6	10	250	280	23848	24374	32	780.0	480.9
⑭	10	200	280	23848	24374	40	974.9	601.1	10	200	300	23848	24414	40	976.5	602.1
⑮	10	200	280	23848	24374	16	390.0	240.4	10	200	300	23848	24414	24	586.9	361.2
⑯	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6
⑰	10	–	160	23848	24134	2	48.3	29.8	10	–	160	23848	24134	2	48.3	29.8
⑱	10	150	150	670	1671	66	110.3	68.0	10	150	150	670	1671	70	117.0	72.1
⑲	10	–	160	4740	5026	16	80.4	49.6	10	–	160	5000	5286	16	84.6	52.1
⑳	10	150	1100	1556	4172	66	275.3	169.8	10	150	1100	1556	4172	70	292.0	180.1
㉑	12	–	200	4740	5099	20	102.0	90.5	12	–	200	3000	5359	20	107.2	95.2
TOTAL STEEL (Kgs)	11385.7								14146.1							
TOTAL CONCRETE (cum)	201.10								274.86							

	1/45/3								1/53/3							
	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	16	240	2050	5160	9205	101	929.7	1467.4	16	250	1500	5900	8845	97	858.0	1354.2
②	20	240	1780	5950	9441	204	1926.0	4749.9	16	250	1950	4100	7945	196	1557.2	2457.8
③	20	150	500	8360	9291	160	1486.6	3668.2	25	250	550	6500	7514	97	728.9	2808.6
④	BAR IS NOT USED								12	250	3500	–	3500	96	336.0	298.3
⑤	10	200	5950	2130	8428	242	2039.7	1257.6	10	200	4100	700	5148	242	1245.9	768.2
⑥	16	150	260	5160	5625	160	900.0	1420.5	20	200	320	5900	6471	121	783.0	1931.1
⑦	BAR IS NOT USED								12	200	3500	–	3500	120	420.0	372.9
⑧	16	240	1800	5160	8905	101	899.4	1419.6	16	250	1400	5900	8645	97	838.6	1323.6
⑨	10	240	200	1498	1851	202	373.8	230.5	10	250	200	1455	1808	194	350.8	216.3
⑩	10	240	200	1710	2076	202	419.3	258.5	10	250	200	1597	1962	194	380.7	234.7
⑪	10	200	230	23848	24274	40	970.9	598.6	10	160	280	23848	24374	62	1511.2	931.7
⑫	10	200	320	23848	24454	50	1222.7	753.8	10	200	250	23848	24314	30	729.4	449.7
⑬	10	200	320	23848	24454	50	1222.7	753.8	10	250	250	23848	24314	24	583.5	359.8
⑭	10	200	300	23848	24414	40	976.5	602.1	10	200	330	23848	24474	50	1223.7	754.4
⑮	10	200	300	23848	24414	36	878.9	541.9	10	200	330	23848	24474	12	293.7	181.1
⑯	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6
⑰	10	–	160	23848	24134	2	48.3	29.8	10	–	160	23848	24134	4	96.5	59.5
⑱	10	150	150	650	1631	72	117.5	72.4	10	150	150	750	1831	82	150.2	92.6
⑲	10	–	160	5160	5446	16	87.1	53.7	10	–	160	5900	6186	16	99.0	61.0
⑳	10	150	1100	1556	4172	72	300.4	185.2	10	150	1100	1556	4172	82	342.1	210.9
㉑	12	–	200	5160	5518	20	110.4	98.0	12	–	200	5900	6259	20	125.2	111.1
TOTAL STEEL (Kgs)	18338.0								15156.0							
TOTAL CONCRETE (cum)	340.39								264.07							

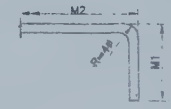
NOTES:

1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

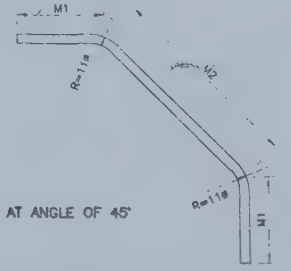
BENDING OF BARS

BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)
BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 3 OF 16)

SCHEDULE OF REINFORCEMENT

BOX – CELL DESIGNATION Nc/ab/Ec

SHAPE OF BARS (NOT TO SCALE)

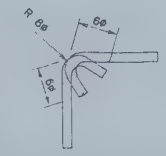
BAR MARK	1/54/3								1/55/3							
	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	16	280	1850	5960	9805	87	835.6	1318.9	16	220	2200	6200	10545	110	1160.0	1830.8
②	20	280	1980	5150	9041	176	1591.3	3924.3	20	220	2100	6200	10331	222	2293.6	5656.3
③	20	120	600	7560	8691	200	1738.3	4286.8	25	220	650	9000	10214	110	1123.6	4329.5
④	BAR IS NOT USED								12	220	3500	–	3500	109	381.5	338.7
⑤	10	200	5150	1230	6728	242	1628.3	1003.9	10	200	6200	1950	8498	242	2056.6	1268.0
⑥	20	200	320	5960	6531	121	790.3	1949.0	25	260	400	6200	6914	93	643.0	2477.8
⑦	12	200	3500	–	3500	120	420.0	372.9	BAR IS NOT USED							
⑧	16	280	1700	5960	9305	87	809.5	1277.7	12	220	2000	6200	10159	110	1117.5	992.1
⑨	10	280	200	1498	1851	174	322.0	198.5	10	220	200	1668	2020	220	444.5	274.0
⑩	10	280	200	1710	2076	174	361.2	222.7	10	220	200	1950	2316	220	509.5	314.1
⑪	10	150	280	23848	24374	62	1511.2	931.7	10	180	280	23848	24374	56	1364.9	841.5
⑫	10	180	270	23848	24354	44	1071.6	660.7	10	150	330	23848	24474	66	1615.3	995.9
⑬	10	240	270	23848	24354	34	828.0	510.5	10	200	330	23848	24474	50	1223.7	754.4
⑭	10	180	350	23848	24514	56	1372.8	846.4	10	160	380	23848	24574	62	1523.6	939.3
⑮	10	180	350	23848	24514	24	588.3	362.7	10	160	380	23848	24574	40	982.9	606.0
⑯	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6
⑰	10	–	160	23848	24134	4	96.5	59.5	10	–	160	23848	24134	4	96.5	59.5
⑱	10	150	150	750	1831	82	150.2	92.6	10	150	150	750	1831	86	157.5	97.1
⑲	10	–	160	5980	6246	16	99.9	61.6	10	–	160	6200	6486	16	103.8	64.0
⑳	10	150	1100	1556	4172	82	342.1	210.9	10	150	1100	1556	4172	86	358.8	221.2
㉑	12	–	200	5980	6319	20	126.4	112.2	12	–	200	6200	6559	20	131.2	116.5
TOTAL STEEL (Kgs)	18582.1								22355.3							
TOTAL CONCRETE (cum)	320.36								413.16							

BAR MARK	1/63/3								1/64/3							
	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	16	240	1600	7060	10205	101	1030.7	1626.8	16	250	1950	7060	10905	97	1057.8	1669.6
②	20	240	2330	4300	8891	204	1813.8	4473.2	20	250	2330	5400	9991	196	1958.3	4829.5
③	28	280	650	7660	8864	87	771.2	3727.5	28	260	700	7860	9164	93	852.2	4119.4
④	16	280	4200	–	4200	86	361.2	570.1	16	260	4200	–	4200	92	386.4	609.9
⑤	10	200	4300	780	5428	242	1313.7	809.9	10	200	5400	880	6628	242	1604.1	989.0
⑥	25	260	400	7060	7774	93	723.0	2786.0	25	240	400	7060	7774	101	785.2	3025.6
⑦	16	260	4200	–	4200	92	386.4	609.9	12	240	4200		4200	100	420.0	372.9
⑧	16	240	1500	7060	10005	101	1010.5	1594.9	16	250	1850	7060	10705	97	1038.4	1638.9
⑨	10	240	200	1710	2063	202	416.7	256.9	10	250	200	1781	2133	194	413.9	255.2
⑩	10	240	200	1851	2217	202	447.8	276.1	10	250	200	1922	2288	194	443.8	273.6
⑪	10	130	330	23848	24474	90	2202.6	1358.0	10	140	350	23848	24514	84	2059.1	1269.5
⑫	10	160	290	23848	24394	36	878.2	541.4	10	160	290	23848	24394	50	1219.7	752.0
⑬	10	220	290	23848	24394	28	683.0	421.1	10	220	290	23848	24394	36	878.2	541.4
⑭	10	160	380	23848	24574	74	1818.5	1121.1	10	160	400	23848	24614	74	1821.4	1123.0
⑮	10	160	380	23848	24574	12	294.9	181.8	10	160	400	23848	24614	18	393.8	242.8
⑯	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6
⑰	10	–	160	23848	24134	4	96.5	59.5	10	–	160	23848	24134	4	96.5	59.5
⑱	10	150	150	850	2031	96	195.0	120.2	10	150	150	900	2131	96	204.6	126.1
⑲	10	–	160	7060	7346	16	117.5	72.5	10	–	160	7060	7346	16	117.5	72.5
⑳	10	150	1100	1556	4172	96	400.5	246.9	10	150	1100	1556	4172	96	400.5	246.9
㉑	12	–	200	7060	7419	20	148.4	131.7	12	–	200	7060	7419	20	148.4	131.7
TOTAL STEEL (Kgs)	21164.2								22527.6							
TOTAL CONCRETE (cum)	346.13								395.12							

NOTES:

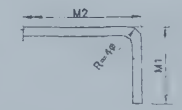
1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

BENDING OF BARS

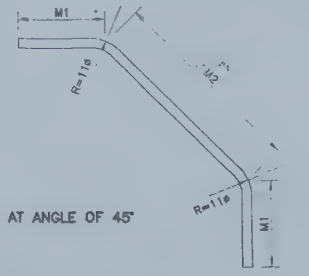


BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
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STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1 9 9 9
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 4 OF 16)

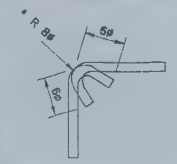
SCHEDULE OF REINFORCEMENT

BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/65/3								1/66/3								1/75/3								1/76/3							
		BAR DIA. in mm	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	20	250	2300	7260	11791	97	1143.8	2820.7	20	260	2650	7600	12831	93	1193.3	2942.9	20	250	2450	8300	13131	97	1273.7	3141.2	16	250	2850	8500	14145	97	1372.1	2165.6
②	M1 M2 M1	20	250	2430	6400	11191	196	2193.5	5409.5	25	260	2600	7450	12564	190	2387.2	9198.7	20	250	2750	6650	12081	196	2367.9	5839.7	25	250	2850	7750	13384	196	2619.4	10093.1
③	M1 M2	28	240	750	9260	10664	101	1077.0	5206.1	28	180	800	10600	12104	134	1621.9	7839.8	32	260	900	9700	11390	93	1059.3	6687.6	32	260	1000	11100	12990	93	1208.1	7627.1
④	M1	16	240	4200	–	4200	100	420.0	662.9	BAR IS NOT USED								16	260	4800	–	4900	92	450.8	711.5	16	260	4900	–	4900	92	450.8	711.5
⑤	0.2m. M1 0.2m M2	10	200	6400	1580	8328	242	2015.5	1242.6	10	200	7450	2250	10048	242	2431.7	1499.3	12	160	6650	1300	8288	300	2486.9	2207.5	12	160	7750	2000	10088	300	3026.9	2688.9
⑥	M1 M2 M1	25	280	400	7260	7974	87	693.8	2673.3	20	200	320	7600	8171	121	988.7	2438.4	28	260	450	8300	9104	93	846.7	4092.5	25	250	400	8500	9214	97	893.8	3444.0
⑦	M1	16	280	4200	–	4200	86	361.2	570.1	12	200	4200	–	4200	120	504.0	447.5	16	260	4900	–	4900	92	450.8	711.5	16	250	4900	–	4900	98	470.4	742.5
⑧	M2 M1 M1	16	250	2100	7260	11405	97	1106.3	1746.1	20	260	2400	7600	12331	93	1146.8	2828.2	20	250	2200	8300	12631	97	1225.2	3021.6	16	250	2500	8500	13445	97	1304.2	2058.4
⑨	M2 M1 M1	10	250	200	1851	2204	194	427.6	263.6	10	260	200	2092	2445	186	454.7	280.3	10	250	200	2021	2374	194	460.5	283.9	10	250	200	2162	2515	194	488.0	300.8
⑩	M1 M2 M1	10	250	200	2134	2500	194	485.0	299.0	10	260	200	2445	2811	186	522.8	322.3	10	250	200	2375	2740	194	531.6	327.8	10	250	200	2657	3023	194	586.5	361.6
⑪	M2 M1 M1	12	200	330	23848	24467	60	1468.0	1303.3	12	220	330	23848	24467	54	1321.2	1173.0	12	160	380	23848	24567	86	2112.7	1875.7	12	160	380	23848	24567	86	2112.7	1875.7
⑫	M2 M1 M1	12	220	340	23848	24487	46	1126.4	1000.0	12	160	430	23848	24667	74	1825.3	1620.6	12	160	350	23848	24507	62	1519.4	1349.0	12	160	400	23848	24607	74	1820.9	1616.6
⑬	M2 M1 M1	10	180	340	23848	24494	58	1371.6	845.7	10	160	430	23848	24674	74	1825.9	1125.7	10	180	350	23848	24514	56	1372.8	846.4	10	160	400	23848	24614	74	1821.4	1123.0
⑭	M2 M1 M1	12	220	430	23848	24667	54	1332.0	1182.6	12	200	450	23848	24707	60	1482.4	1316.1	12	160	500	23848	24807	86	2133.4	1894.1	12	160	550	23848	24907	86	2142.0	1901.7
⑮	M2 M1 M1	12	220	430	23848	24667	24	592.0	525.6	12	200	450	23848	24707	36	889.4	789.7	12	160	500	23848	24807	24	595.4	528.6	12	160	550	23848	24907	36	896.6	796.1
⑯	M2 M1 M1	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6
⑰	M2 M1 M1	10	–	160	23848	24134	4	96.5	59.5	10	–	160	23848	24134	4	96.5	59.5	10	–	160	23848	24134	6	144.8	89.3	10	–	160	23848	24134	6	144.8	89.3
⑱	M1 M2	10	150	150	850	2031	100	203.1	125.2	10	150	150	850	2031	104	211.3	130.2	10	150	150	950	2231	114	254.4	156.8	10	150	150	950	2231	116	258.8	159.6
⑲	M1 M2 M1	10	–	160	7260	7546	16	120.7	74.4	10	–	160	7600	7886	16	126.2	77.8	10	–	160	8300	8586	16	137.4	84.7	10	–	160	8500	9786	16	140.6	86.7
⑳	M1 M1+0.2m M2 0.2m	10	150	1100	1556	4172	100	417.2	257.2	10	150	1100	1556	4172	104	433.9	267.5	10	150	1200	1697	4513	114	514.5	317.2	10	150	1300	1838	4855	116	563.2	347.2
㉑	M1 M2 M1	12	–	200	7260	7619	20	152.4	135.3	12	–	200	7600	7959	20	159.2	141.3	12	–	200	8300	8659	20	173.2	153.7	12	–	200	8500	8859	20	177.2	157.3
TOTAL STEEL (Kgs)		26581.4								34677.4								34498.9								38523.5							
TOTAL CONCRETE (cum)		479.72								606.97								566.63								693.65							

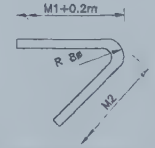
NOTES:

1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

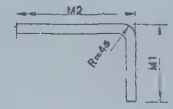
BENDING OF BARS



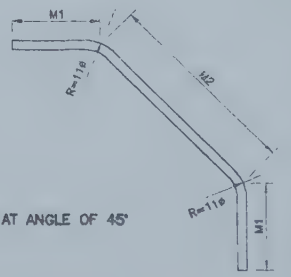
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)
BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 5 OF 16)

DRG.NO. SD/109 (SHEET 6 OF 16)

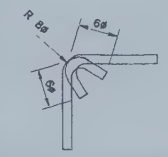
SCHEDULE OF REINFORCEMENT

BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/77/3								1/85/3								1/86/3								1/87/3							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	25	260	3150	8900	15114	93	1405.6	5416.4	20	220	2550	9400	14431	110	1587.4	3914.9	20	280	2950	9700	15531	87	1351.2	3332.3	25	280	3250	10000	16414	87	1428.0	5502.7
②	M1 M2 M1	25	260	3050	9750	14764	190	2805.2	10809.4	20	220	3100	6870	13001	222	2886.3	7118.1	25	280	3250	7950	14364	176	2528.1	9741.7	28	280	3400	8950	15654	176	2755.1	13317.1
③	M1 M2 M1	32	240	1000	12300	14190	101	1433.2	9048.3	32	240	1000	10000	11890	101	1200.9	7581.7	28	150	1100	11300	13404	160	2144.6	10366.4	28	140	1100	12600	14704	172	2529.1	12224.6
④	M1	16	240	4900	–	4900	100	490.0	773.4	16	240	5600	–	5600	100	560.0	883.9	BAR IS NOT USED								BAR IS NOT USED							
⑤	0.2m. M1 0.2m. M2	12	160	8750	2600	11688	300	3506.5	3113.1	12	160	6870	950	8158	300	2447.5	2172.9	12	160	7950	1600	9888	300	2966.5	2633.7	12	160	8950	2250	11538	300	3461.5	3073.1
⑥	M1 M2 M1	25	260	400	8900	9614	93	894.1	3445.4	28	250	450	9400	10204	97	989.8	4784.2	28	280	450	9700	10504	87	913.8	4417.2	25	250	400	10000	10714	97	1039.3	4004.7
⑦	M1	16	260	4900	–	4900	92	450.8	711.5	20	250	5600	–	5600	96	537.6	1325.8	20	280	5600	–	5600	86	481.6	1187.7	20	250	5600	–	5600	96	537.6	1325.8
⑧	M2 M1 M1	20	260	2800	8900	14431	93	1342.1	3309.9	20	220	2320	9400	13971	110	1536.8	3790.1	20	280	2600	9700	14831	87	1290.3	3182.1	20	280	2900	10000	15731	87	1368.6	3375.2
⑨	M2 MT M1	10	260	200	2445	2798	186	520.4	320.9	10	220	200	2261	2614	220	575.1	354.6	10	280	200	2445	2798	174	486.9	300.2	10	280	200	2657	3010	174	523.8	322.9
⑩	M1 M2 M1	10	260	200	2940	3306	186	614.9	379.1	10	220	200	2587	2952	220	649.5	400.4	10	280	200	2940	3306	174	575.2	354.6	10	280	200	3152	3518	174	612.1	377.4
⑪	M2 M1 M1	12	160	380	23848	24567	86	2112.7	1875.7	12	140	440	23848	24687	112	2764.9	2454.7	12	150	430	23848	24667	106	2614.7	2321.4	12	160	430	23848	24667	100	2466.7	2190.0
⑫	M2 M1 M1	12	140	500	23848	24807	98	2431.1	2158.3	12	160	380	23848	24567	62	1523.1	1352.3	12	150	450	23848	24707	78	1927.1	1710.9	12	130	530	23848	24867	106	2635.9	2340.2
⑬	M2 M1 M1	12	180	500	23848	24807	78	1934.9	1717.9	10	170	380	23848	24574	58	1425.3	878.7	12	200	450	23848	24707	60	1482.4	1316.1	12	170	530	23848	24867	82	2039.1	1810.3
⑭	M2 M1 M1	12	160	550	23848	24907	86	2142.0	1901.7	12	160	550	23848	24907	100	2490.7	2211.3	12	150	600	23848	25007	106	2650.7	2353.4	12	150	600	23848	25007	106	2650.7	2353.4
⑮	M2 M1 M1	12	160	550	23848	24907	48	1195.5	1061.4	12	160	550	23848	24907	12	298.9	265.4	12	150	600	23848	25007	28	700.2	621.6	12	150	600	23848	25007	40	1000.3	888.1
⑯	M2 M1 M1	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6	10	–	160	23848	24134	12	289.6	178.6
⑰	M2 M1 M1	10	–	160	23848	24134	6	144.8	89.3	10	–	160	23848	24134	6	144.8	89.3	10	–	160	23848	24134	6	144.8	89.3	10	–	160	23848	24134	6	144.8	89.3
⑱	M1 M2	10	150	150	950	2231	122	272.2	167.8	10	150	150	1070	2471	128	316.3	195.0	10	150	150	1050	2431	132	320.9	197.9	10	150	150	1050	2431	136	330.7	203.9
⑲	M1 M1 M2	10	–	160	8900	9186	16	147.0	90.6	10	–	160	9400	9686	16	155.0	95.5	10	–	160	9700	9986	16	159.8	98.5	10	–	160	10000	10286	16	164.6	101.5
⑳	M1+0.2m M1 M2	10	150	1300	1838	4855	122	592.3	365.2	10	150	1300	1838	4855	128	621.4	383.1	10	150	1400	1980	5196	132	685.9	422.9	10	150	1400	1980	5196	136	706.7	435.7
㉑	M1 M1 M2	12	–	200	8900	9259	20	185.2	164.4	12	–	200	9400	9759	20	195.2	173.3	12	–	200	9700	10059	20	201.2	178.6	12	–	200	10000	10359	20	207.2	183.9
TOTAL STEEL (Kgs)		47098.2								40603.8								45004.9								54298.4							
TOTAL CONCRETE (cum)		839.05								659.64								802.86								940.83							

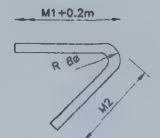
NOTES:

1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

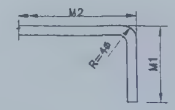
BENDING OF BARS



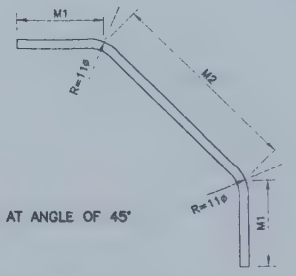
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R), S&R MOST	DRG. NO. SD/109 (SHEET 6 OF 16)

DRG.NO. SD/109 (SHEET 7 OF 16)

SCHEDULE OF REINFORCEMENT

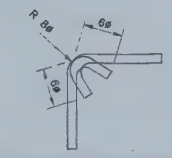
BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/22/4								1/23/4							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	10	220	900	2460	4226	128	540.9	333.5	12	240	1220	2700	5099	117	596.6	529.6
②	M1 M2 M1	10	220	830	2530	4156	258	1072.2	661.0	12	240	950	3590	5449	238	1296.8	1151.3
③	M1 M2 M1	12	120	250	3460	3919	233	913.1	810.6	12	130	270	4700	5199	216	1122.9	997.0
④	M1	BAR IS NOT USED								BAR IS NOT USED							
⑤	0.2m. M1 0.2m. M2	10	200	2530	680	3558	282	1003.5	618.7	10	200	3590	1300	5238	282	1477.3	910.8
⑥	M2 M1 M1	12	130	200	2460	2819	216	608.9	540.6	10	120	160	2700	2986	233	695.7	428.9
⑦	M1	BAR IS NOT USED								BAR IS NOT USED							
⑧	M2 M1 M1	12	220	830	2460	4079	128	522.1	463.5	12	240	1170	2700	4999	117	584.9	519.2
⑨	M2 M1 M1	10	220	200	763	1115	256	285.5	176.0	10	240	200	989	1342	234	313.9	193.6
⑩	M1 M2 M1	10	220	200	862	1227	256	314.2	193.7	10	240	200	1060	1425	234	333.5	205.6
⑪	M2 M1 M1	10	250	160	27848	28134	16	450.1	277.5	10	250	160	27848	28134	16	450.1	277.5
⑫	M2 M1 M1	10	250	160	27848	28134	16	450.1	277.5	10	250	200	27848	28214	24	677.1	417.5
⑬	M2 M1 M1	10	250	160	27848	28134	16	450.1	277.5	10	250	200	27848	28214	24	677.1	417.5
⑭	M2 M1 M1	10	250	180	27848	28174	16	450.8	277.9	10	250	190	27848	28194	16	451.1	278.1
⑮	M2 M1 M1	10	250	180	27848	28174	12	338.1	208.4	10	250	190	27848	28194	20	563.9	347.6
⑯	M2 M1 M1	10	–	160	27848	28134	12	337.6	208.1	10	–	160	27848	28134	12	337.6	208.1
⑰	M2 M1 M1	10	–	160	27848	28134	2	56.3	34.7	10	–	160	27848	28134	2	56.3	34.7
⑱	M1 M2	10	150	150	480	1291	36	46.5	28.7	10	150	150	520	1371	38	52.1	32.1
⑲	M1 M2 M1	10	–	160	2460	2746	16	43.9	27.1	10	–	160	2700	2986	16	47.8	29.5
⑳	M1+0.2m M1 135° M2 0.2m.	10	150	1100	1556	4172	36	150.2	92.6	10	150	1100	1556	4172	38	158.5	97.7
㉑	M1 M2 M1	12	–	200	2460	2819	20	56.4	50.1	12	–	200	2700	3059	20	61.2	54.3
TOTAL STEEL (Kgs)		5557.8								7130.8							
TOTAL CONCRETE (cum)		93.10								150.22							

BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/33/4								1/34/4							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	12	250	1320	3740	6339	113	716.3	635.9	16	260	1700	3900	7245	109	789.7	1246.4
②	M1 M2 M1	16	250	1270	3760	6235	228	1421.6	2243.8	16	260	1350	4850	7495	220	1648.9	2602.5
③	M1 M2 M1	20	250	370	5240	5911	113	668.0	1647.3	20	260	450	6700	7531	109	820.9	2024.5
④	M1	10	250	2100	–	2100	112	235.2	145.0	10	260	2100	–	2100	108	226.8	139.8
⑤	0.2m. M1 0.2m. M2	10	200	3750	1070	5168	282	1457.5	898.6	10	200	4850	1800	6998	282	1973.6	1216.8
⑥	M2 M1 M1	20	250	320	3740	4311	113	487.2	1201.5	16	260	260	3900	4365	109	475.8	751.0
⑦	M1	BAR IS NOT USED								10	260	2100	–	2100	108	226.8	139.8
⑧	M2 M1 M1	12	250	1230	3740	6159	113	695.9	617.9	16	260	1550	3900	6945	109	757.0	1194.8
⑨	M2 M1 M1	10	250	200	1102	1455	226	328.8	202.7	10	260	200	1243	1596	218	348.0	214.5
⑩	M1 M2 M1	10	250	200	1229	1595	226	360.4	222.2	10	260	200	1455	1821	218	397.0	244.8
⑪	M2 M1 M1	10	250	190	27848	28194	24	676.6	417.2	10	250	200	27848	28214	24	677.1	417.5
⑫	M2 M1 M1	10	250	210	27848	28234	24	677.6	417.8	10	220	250	27848	28314	36	1019.3	628.4
⑬	M2 M1 M1	10	250	210	27848	28234	24	677.6	417.8	10	250	250	27848	28314	32	906.0	558.6
⑭	M2 M1 M1	10	250	240	27848	28294	24	679.0	418.7	10	220	280	27848	28374	28	794.5	489.8
⑮	M2 M1 M1	10	250	240	27848	28294	16	452.7	279.1	10	220	280	27848	28374	32	908.0	559.8
⑯	M2 M1 M1	10	–	160	27848	28134	12	337.6	208.1	10	–	160	27848	28134	12	337.6	208.1
⑰	M2 M1 M1	10	–	160	27848	28134	2	56.3	34.7	10	–	160	27848	28134	2	56.3	34.7
⑱	M1 M2	10	150	150	580	1491	52	77.5	47.8	10	150	150	600	1531	54	82.7	51.0
⑲	M1 M2 M1	10	–	160	3740	4026	16	64.4	39.7	10	–	160	3900	4186	16	67.0	41.3
⑳	M1+0.2m M1 135° M2 0.2m.	10	150	1100	1556	4172	52	216.9	133.8	10	150	1100	1556	4172	54	225.3	138.9
㉑	M1 M2 M1	12	–	200	3740	4099	20	82.0	72.8	12	–	200	3900	4259	20	85.2	75.6
TOTAL STEEL (Kgs)		10302.3								12978.8							
TOTAL CONCRETE (cum)		190.43								270.65							

NOTES:

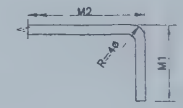
1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

BENDING OF BARS

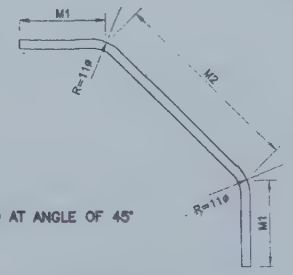


BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 7 OF 16)

DRG.NO. SD/109 (SHEET 8 OF 16)

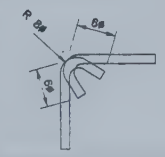
SCHEDULE OF REINFORCEMENT

BAR MARK	SHAPE OF BARS (NOT TO SCALE) / BOX – CELL DESIGNATION Nc/ab/Ec	1/43/4								1/44/4								1/45/4								1/53/4							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	16	260	1450	4800	7645	109	833.3	1318.2	16	220	1750	5000	8445	128	1081.0	1706.1	20	260	2100	5200	9331	109	1017.1	2508.4	16	220	1550	5940	8985	128	1150.1	1815.2
②	M1 M2	16	260	1600	4000	7145	220	1571.9	2481.0	16	220	1700	5000	8345	258	2153.0	3398.2	20	260	1800	6050	9581	220	2107.9	5198.4	16	220	1970	4220	8105	258	2091.1	3300.5
③	M1 M2 M1	25	280	500	5800	6514	101	657.9	2535.2	25	280	500	7000	7914	101	799.3	3080.1	25	260	550	8400	9414	109	1026.1	3954.1	25	220	600	6540	7854	128	979.7	3775.3
④	M1	12	280	2800	–	2800	100	280.0	248.6	12	280	2800	–	2800	100	280.0	248.6	12	260	2800	–	2800	108	302.4	268.5	12	220	3500	–	3500	127	444.5	394.6
⑤	0.2m. M1 0.2m. M2	10	200	4000	750	5098	282	1437.8	886.4	10	200	5000	1450	6798	282	1917.2	1182.0	10	200	6050	2150	8548	282	2410.7	1486.3	10	200	4220	720	5288	282	1491.4	919.5
⑥	M1 M2 M1	20	220	320	4800	5371	128	687.5	1695.6	20	250	320	5000	5571	113	629.6	1552.6	20	280	320	5200	5771	101	582.9	1437.5	25	280	400	5940	6654	101	672.1	2589.7
⑦	M1	12	220	2800	–	2800	127	355.6	315.7	12	250	2800	–	2800	112	313.6	278.4	12	280	2800	–	2800	100	280.0	248.6	16	280	3500	–	3500	100	350.0	552.4
⑧	M1 M2 M1	16	260	1350	4800	7445	109	811.5	1280.8	16	220	1650	5000	8245	128	1055.4	1665.7	16	260	1950	5200	9045	109	985.9	1556.1	16	220	1470	5940	8825	128	1129.6	1782.9
⑨	M2 M1 M1	10	260	200	1314	1667	218	363.4	224.0	10	280	200	1455	1808	202	365.3	225.2	10	260	200	1597	1950	218	425.0	262.0	10	220	200	1583	1935	256	495.5	305.5
⑩	M1 M2 M1	10	260	200	1455	1821	218	397.0	244.8	10	280	200	1597	1962	202	396.4	244.4	10	260	200	1809	2175	218	474.1	292.3	10	220	200	1696	2061	256	527.7	325.4
⑪	M2 M1 M1	10	180	250	27848	28314	44	1245.8	768.1	10	200	250	27848	28314	40	1132.5	698.3	10	200	250	27848	28314	40	1132.5	698.3	10	150	310	27848	28434	68	1876.6	1157.0
⑫	M2 M1 M1	10	200	230	27848	28274	30	848.2	523.0	10	180	280	27848	28374	44	1248.4	769.7	10	150	330	27848	28474	66	1879.3	1158.6	10	200	260	27848	28334	30	850.0	524.1
⑬	M2 M1 M1	10	250	230	27848	28274	24	678.6	418.4	10	220	280	27848	28374	36	1021.5	629.8	10	200	330	27848	28474	50	1423.7	877.8	10	250	260	27848	28334	24	680.0	419.3
⑭	M2 M1 M1	10	200	300	27848	28414	40	1136.5	700.7	10	200	300	27848	28414	40	1136.5	700.7	10	200	330	27848	28474	40	1138.9	702.2	10	180	350	27848	28514	56	1596.8	984.5
⑮	M2 M1 M1	10	200	300	27848	28414	12	341.0	210.2	10	200	300	27848	28414	24	681.9	420.4	10	200	330	27848	28474	36	1025.1	632.0	10	180	350	27848	28514	12	342.2	211.0
⑯	M2 M1 M1	10	–	160	27848	28134	12	337.6	208.1	10	–	160	27848	28134	12	337.6	208.1	10	–	160	27848	28134	12	337.6	208.1	10	–	160	27848	28134	12	337.6	208.1
⑰	M2 M1 M1	10	–	160	27848	28134	2	56.3	34.7	10	–	160	27848	28134	2	56.3	34.7	10	–	160	27848	28134	4	112.5	69.4	10	–	160	27848	28134	4	112.5	69.4
⑱	M1 M2	10	150	150	700	1731	66	114.3	70.5	10	150	150	700	1731	70	121.2	74.7	10	150	150	700	1731	72	124.7	76.9	10	150	150	820	1971	82	161.6	99.7
⑲	M1 M2 M1	10	–	160	4800	5086	16	81.4	50.2	10	–	160	5000	5286	16	84.6	52.1	10	–	160	5200	5486	16	87.8	54.1	10	–	160	5940	6228	16	99.6	61.4
⑳	M1+0.2m M1 135° M2 0.2m.	10	150	1100	1556	4172	66	275.3	169.8	10	150	1100	1556	4172	70	292.0	180.1	10	150	1100	1556	4172	72	300.4	185.2	10	150	1100	1556	4172	82	342.1	210.9
㉑	M1 M2 M1	12	–	200	4800	5159	20	103.2	91.6	12	–	200	5000	5359	20	107.2	95.2	12	–	200	5200	5559	20	111.2	98.7	12	–	200	5940	6299	20	126.0	111.8
TOTAL STEEL (Kgs)		14472.6								17445.2								21973.4								19818.1							
TOTAL CONCRETE (cum)		248.97								324.07								421.49								332.67							

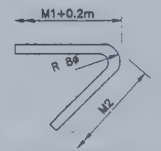
NOTES:

1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

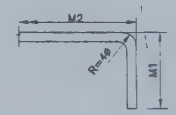
BENDING OF BARS



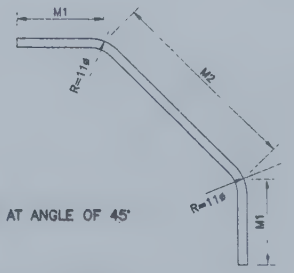
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 8 OF 16)

DRG.NO. SD/109 (SHEET 9 OF 16)

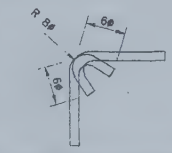
SCHEDULE OF REINFORCEMENT

BAR MARK	SHAPE OF BARS (NOT TO SCALE) / BOX – CELL DESIGNATION Nc/ab/Ec	1/54/4								1/55/4								1/63/4								1/64/4							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	16	200	1900	6040	9785	141	1379.7	2177.6	20	260	2230	6300	10691	109	1165.4	2873.9	16	240	1700	7160	10505	117	1229.1	1939.9	20	280	2000	7160	11091	101	1120.2	2762.6
②	M1 M2 M1	16	200	2020	5250	9235	284	2622.8	4139.6	20	260	2150	6280	10511	220	2312.5	5703.0	20	240	2380	4500	9191	238	2187.5	5394.8	20	280	2380	5500	10191	204	2079.0	5127.2
③	M1 M2 M1	25	170	650	7440	8654	165	1427.9	3502.4	28	220	680	8700	9964	128	1275.4	6184.7	32	300	750	7780	9150	94	860.1	5430.2	28	180	750	7760	9164	156	1429.6	6910.0
④	M1	BAR IS NOT USED								BAR IS NOT USED								16	300	4200	–	4200	93	390.6	616.5	BAR IS NOT USED							
⑤	0.2m. M1 0.2m. M2	10	200	5250	1170	6768	282	1908.7	1176.8	12	200	6280	1800	8418	282	2373.9	2107.6	12	200	4500	830	5668	282	1598.4	1419.1	12	200	5500	830	6668	282	1880.4	1669.5
⑥	M2 M1 M1	20	130	320	6040	8611	216	1428.0	3521.8	20	200	320	6300	8871	141	968.9	2389.4	28	280	450	7160	7964	101	804.3	3888.0	28	280	450	7160	7964	101	804.3	3888.0
⑦	M1	BAR IS NOT USED								12	200	3500	–	3500	140	490.0	435.0	16	280	4200	–	4200	100	420.0	662.9	16	280	4200	–	4200	100	420.0	662.9
⑧	M2 M1 M1	16	200	1750	6040	9485	141	1337.4	2110.9	20	260	2050	6300	10331	109	1126.1	2777.2	16	240	1600	7160	10305	117	1205.7	1903.0	20	280	1900	7160	10891	101	1100.0	2712.8
⑨	M2 M1 M1	10	200	200	1525	1978	282	557.8	343.9	10	260	200	1809	2162	218	471.3	290.5	10	240	200	1922	2275	234	532.3	328.2	10	220	200	1922	2275	256	582.4	359.0
⑩	M1 M2 M1	10	200	200	1837	2203	282	621.2	383.0	10	260	200	2063	2429	218	529.5	326.5	10	240	200	2063	2429	234	568.4	350.4	10	220	200	2063	2429	256	621.9	383.4
⑪	M2 M1 M1	12	220	300	27848	28407	46	1306.7	1160.1	12	240	300	27848	28407	42	1193.1	1059.2	12	180	380	27848	28567	66	1885.4	1673.9	12	180	380	27848	28567	66	1885.4	1673.9
⑫	M2 M1 M1	12	250	290	27848	28387	32	908.4	808.5	12	200	350	27848	28507	50	1425.3	1265.4	12	250	320	27848	28447	24	682.7	606.1	12	220	320	27848	28447	36	1024.1	909.2
⑬	M2 M1 M1	10	220	290	27848	28394	36	1022.2	630.2	10	180	350	27848	28514	56	1596.8	984.5	10	200	320	27848	28454	30	853.6	526.3	10	200	320	27848	28454	40	1138.1	701.7
⑭	M2 M1 M1	12	250	380	27848	28567	40	1142.7	1014.5	12	240	390	27848	28587	42	1200.6	1066.0	12	220	430	27848	28667	54	1548.0	1374.3	12	220	430	27848	28667	54	1548.0	1374.3
⑮	M2 M1 M1	12	250	380	27848	28567	16	457.1	405.8	12	240	390	27848	28587	24	686.1	609.1	12	220	430	27848	28667	12	344.0	305.4	12	220	430	27848	28667	12	344.0	305.4
⑯	M2 M1 M1	12	–	200	27848	28207	12	338.5	300.5	12	–	200	27848	28207	12	338.5	300.5	12	–	200	27848	28207	12	338.5	300.5	12	–	200	27848	28207	12	338.5	300.5
⑰	M2 M1 M1	10	–	160	27848	28134	4	112.5	69.4	10	–	160	27848	28134	4	112.5	69.4	10	–	160	27848	28134	4	112.5	69.4	10	–	160	27848	28134	4	112.5	69.4
⑱	M1 M2	10	150	150	800	1931	84	162.2	100.0	10	150	150	800	1931	86	166.1	102.4	10	150	150	950	2231	98	218.7	134.8	10	150	150	950	2231	98	218.7	134.8
⑲	M1 M2 M1	10	–	160	6040	6326	16	101.2	62.4	10	–	160	6300	6586	16	105.4	65.0	10	–	160	7160	7446	16	119.1	73.4	10	–	160	7160	7446	16	119.1	73.4
㉙	M1+0.2m M1 135° M2 0.2m.	10	150	1100	1556	4172	84	350.4	216.1	10	150	1100	1556	4172	86	358.8	221.2	10	150	1100	1556	4172	98	408.8	252.1	10	150	1100	1556	4172	98	408.8	252.1
㉑	M1 M2 M1	12	–	200	6040	6399	20	128.0	113.6	12	–	200	6300	6659	20	133.2	118.2	12		200	7160	7519	20	150.4	133.5	12	–	200	7160	7519	20	150.4	133.5
TOTAL STEEL (Kgs)		24235.0								28928.8								27382.8								30403.8							
TOTAL CONCRETE (cum)		399.46								506.50								456.87								492.08							

NOTES:

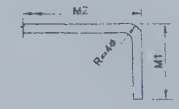
1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

BENDING OF BARS

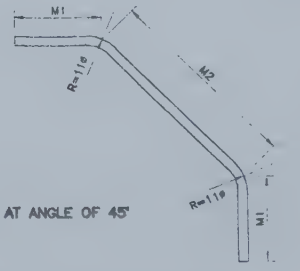


BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

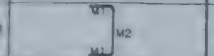
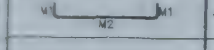
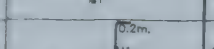
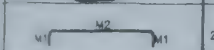
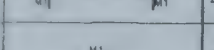
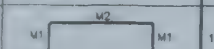
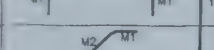
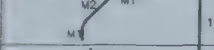
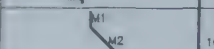
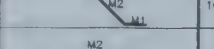
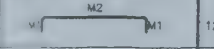
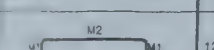
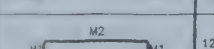
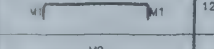
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E.(R) S&R MOST	DRG. NO. SD/109 (SHEET 9 OF 16)

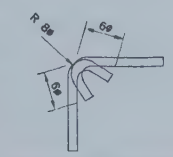
SCHEDULE OF REINFORCEMENT

BAR MARK	SHAPE OF BARS (NOT TO SCALE)	BOX – CELL DESIGNATION No/ab/Eo	1/65/4								1/66/4								1/75/4								1/76/4							
			BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①			20	300	2350	7340	11971	94	1125.3	2775.2	20	260	2750	7680	13091	109	1427.0	3519.1	16	260	2500	8440	13385	109	1459.0	2302.8	20	260	2850	8660	14291	109	1557.8	3841.7
②			25	300	2470	6500	11354	192	2180.0	8400.3	25	260	2630	7800	12774	220	2810.3	10829.2	25	260	2820	6800	12354	220	2717.9	10473.1	25	260	2930	7820	13594	220	2990.7	11524.3
③			32	280	800	9140	10630	101	1073.6	6778.3	25	130	900	10460	12174	216	2629.6	10132.0	32	250	950	9440	11230	113	1269.0	8011.7	32	240	1000	10860	12750	117	1491.8	9418.0
④			16	280	4200	–	4200	100	420.0	662.9	BAR IS NOT USED								16	250	4900	–	4900	112	548.8	866.2	16	240	4900	–	4900	116	568.4	897.1
⑤			12	200	6500	1520	8358	282	2357.0	2092.6	10	200	7600	2180	10128	282	2856.2	1761.0	12	150	6800	1170	8308	374	3107.3	2758.7	12	150	7820	1880	10038	374	3754.3	3333.1
⑥			25	240	400	7340	8054	117	942.3	3631.2	25	280	400	7660	8374	101	845.8	3259.1	28	240	450	8440	9244	117	1081.5	5227.8	25	220	400	8660	9374	128	1199.9	4623.6
⑦			16	240	4200	–	4200	116	487.2	769.0	16	280	4200	–	4200	100	420.0	662.9	16	240	4900	–	4900	116	568.4	897.1	16	220	4900	–	4900	127	622.3	982.2
⑧			16	300	2150	7340	11585	94	1089.0	1718.8	20	260	2450	7660	12491	109	1361.6	3357.8	20	260	2300	8440	12971	109	1413.9	3486.8	20	260	2570	8660	13731	109	1496.7	3691.1
⑨			10	300	200	1979	2331	188	438.3	270.2	10	260	200	2205	2558	218	557.6	343.8	10	260	200	2261	2614	218	569.9	351.4	10	260	200	2375	2727	218	594.6	366.6
⑩			10	300	200	2261	2627	188	493.9	304.5	10	260	200	2629	2995	218	652.8	402.5	10	260	200	2544	2910	218	634.4	391.1	10	260	200	2770	3136	218	683.7	421.5
⑪			12	180	350	27848	28507	86	1881.4	1670.4	12	200	350	27848	28507	60	1710.4	1518.5	12	150	430	27848	28667	92	2637.3	2341.5	12	160	410	27848	28627	86	2461.9	2185.7
⑫			12	200	360	27848	28527	50	1426.3	1268.3	12	160	440	27848	28687	74	2122.8	1884.7	12	160	390	27848	28587	62	1772.4	1573.5	12	160	440	27848	28687	74	2122.8	1884.7
⑬			10	180	360	27848	28534	56	1597.9	985.2	12	200	440	27848	28687	60	1721.2	1528.1	12	240	390	27848	28587	42	1200.6	1066.0	12	200	440	27848	28687	60	1721.2	1528.1
⑭			12	200	450	27848	28707	60	1722.4	1529.2	12	180	500	27848	28807	66	1901.2	1688.0	12	160	530	27848	28867	88	2482.5	2204.0	12	160	550	27848	28907	86	2486.0	2207.1
⑮			12	200	450	27848	28707	24	689.0	611.7	12	180	500	27848	28807	36	1037.0	920.7	12	160	530	27848	28867	16	461.9	410.1	12	160	550	27848	28907	32	925.0	821.2
⑯			12	–	200	27848	28207	12	338.5	300.5	10	–	160	27848	28134	12	337.6	208.1	10	–	160	27848	28134	12	337.6	208.1	10	–	160	27848	28134	12	337.6	208.1
⑰			10	–	160	27848	28134	4	112.5	69.4	10	–	160	27848	28134	6	168.8	104.1	10	–	160	27848	28134	6	168.8	104.1	10	–	160	27848	28134	6	168.8	104.1
⑱			10	150	150	900	2131	100	213.1	131.4	10	150	150	900	2131	104	221.7	136.7	10	150	150	1050	2431	116	282.0	173.9	10	150	150	1020	2371	118	279.8	172.5
⑲			10	–	160	7340	7626	16	122.0	75.2	10	–	160	7660	7946	16	127.1	78.4	10	–	160	8440	8726	16	139.6	86.1	10	–	160	8660	8946	16	143.1	88.2
⑳			10	150	1100	1556	4172	100	417.2	257.2	10	150	1200	1697	4513	104	469.4	289.4	10	150	1250	1768	4684	116	543.4	335.0	10	150	1300	1838	4855	118	572.9	353.2
㉑			12	–	200	7340	7699	20	154.0	136.7	12	–	200	7660	8019	20	160.4	142.4	12	–	200	8440	8799	20	176.0	156.2	12	–	200	8660	9019	20	180.4	160.1
TOTAL STEEL (Kgs)			34436.1								42767.3								43425.1								48812.5							
TOTAL CONCRETE (cum)			591.80								755.76								713.34								849.08							

NOTES:

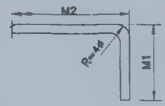
1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

BENDING OF BARS

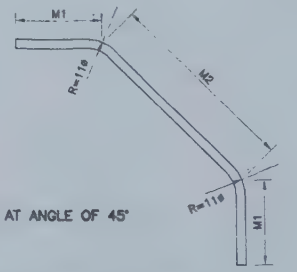


BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 10 OF 16)

DRG.NO. SD/109 (SHEET 11 OF 16)

SCHEDULE OF REINFORCEMENT

BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/77/4								1/85/4								1/86/4								1/87/4							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	25	260	3200	9000	15314	109	1669.2	6432.2	20	260	2650	9600	14831	109	1616.6	3986.8	20	250	3000	9800	15731	113	1777.6	4383.9	25	280	3400	10100	16814	101	1698.2	6543.9
②	M1 M2 M1	25	260	3100	8870	14984	220	3296.5	12702.7	25	260	3200	7050	13364	220	2940.1	11329.3	25	250	3300	8100	14614	228	3332.0	12839.5	25	280	3450	9200	16014	204	3266.9	12588.5
③	M1 M2 M1	28	140	1050	12200	14204	200	2840.8	13731.3	28	140	1100	10200	12304	200	2460.8	11894.5	32	180	1150	11200	13390	156	2088.9	13187.7	28	140	1250	12500	14904	200	2980.8	14408.1
④	M1	BAR IS NOT USED								BAR IS NOT USED								BAR IS NOT USED								BAR IS NOT USED							
⑤	0.2m. M1 0.2m. M2	12	150	8870	2550	11758	374	4397.6	3904.2	12	150	7050	1050	8438	374	3155.9	2801.8	12	150	8100	1550	9988	374	3735.6	3316.5	12	150	9200	2200	11738	374	4390.1	3897.6
⑥	M1 M2 M1	28	280	450	9000	9804	101	990.2	4786.2	32	280	520	9600	10530	101	1063.5	6714.5	28	240	450	9800	10604	117	1240.7	5896.9	28	260	450	10100	10904	108	1177.6	5692.2
⑦	M1	16	280	4900	–	4900	100	490.0	773.4	20	280	5600	–	5600	100	560.0	1381.0	20	240	5600	–	5600	116	649.6	1602.0	20	260	5600	–	5600	108	604.8	1491.5
⑧	M1 M2 M1	25	260	2870	9000	14654	109	1597.3	6135.0	20	260	2400	9600	14331	109	1562.1	3852.4	20	250	2700	9800	15131	113	1709.8	4216.7	25	280	3000	10100	16014	101	1617.4	5232.6
⑨	M1 M2 M1	10	260	200	2615	2968	218	647.0	398.9	10	260	200	2516	2869	218	625.4	385.6	10	250	200	2657	3010	226	680.3	419.4	10	280	200	2869	3222	202	650.9	401.3
⑩	M1 M2 M1	10	260	200	3082	3447	218	751.5	463.3	10	260	200	2869	3235	218	705.3	434.8	10	250	200	3082	3447	226	779.1	480.3	10	280	200	3435	3801	202	767.7	473.3
⑪	M1 M2 M1	12	160	410	27848	28627	86	2461.9	2185.7	12	130	480	27848	28767	122	3509.5	3115.8	12	140	480	27848	28767	112	3221.9	2860.4	12	150	480	27848	28767	106	3049.3	2707.2
⑫	M1 M2 M1	12	130	530	27848	28867	106	3059.9	2716.6	12	150	430	27848	28667	66	1892.0	1679.8	12	160	480	27848	28767	74	2128.7	1889.9	12	140	550	27848	28907	96	2832.9	2515.1
⑬	M1 M2 M1	12	170	530	27848	28867	82	2367.1	2101.5	12	220	430	27848	28667	46	1318.7	1170.7	12	180	480	27848	28767	66	1898.6	1685.6	12	180	550	27848	28907	86	2486.0	2207.1
⑭	M1 M2 M1	12	160	580	27848	28967	88	2491.1	2211.7	12	150	600	27848	29007	106	3074.7	2729.8	12	150	630	27848	29067	106	3081.1	2735.4	12	130	680	27848	29167	122	3558.3	3159.2
⑮	M1 M2 M1	12	160	580	27848	28967	44	1274.5	1131.6	12	150	600	27848	29007	12	348.1	309.0	12	150	630	27848	29067	24	697.6	619.3	12	130	680	27848	29167	40	1166.7	1035.8
⑯	M1 M2 M1	10		160	27848	28134	12	337.6	208.1	10	–	160	27848	28134	12	337.6	208.1	10	–	160	27848	28134	12	337.6	208.1	10	–	160	27848	28134	12	337.6	208.1
⑰	M1 M2 M1	10	–	160	27848	28134	6	168.8	104.1	10	–	160	27848	28134	6	168.8	104.1	10	–	160	27848	28134	8	225.1	138.8	10		160	27848	28134	8	225.1	138.8
⑱	M1 M2	10	150	150	1020	2371	122	289.3	178.4	10	150	150	1150	2631	130	342.1	210.9	10	150	150	1150	2631	134	352.6	217.4	10	150	150	1150	2631	138	363.1	223.9
⑲	M1 M2 M1	10	–	160	9000	9286	16	148.6	91.6	10	–	160	9600	9886	16	158.2	97.5	10	–	160	9800	10086	16	161.4	99.5	10	–	160	10100	10386	16	166.2	102.5
⑳	M1+0.2m M1 135° M2 0.2m.	10	150	1350	1909	5025	122	613.1	378.0	10	150	1400	1980	5196	130	675.5	416.5	10	150	1450	2051	5367	134	719.2	443.4	10	150	1550	2192	5708	138	787.7	485.7
㉑	M1 M2 M1	12	–	200	9000	9359	20	187.2	166.2	12	–	200	9600	9959	20	199.2	176.8	12	–	200	9800	10159	20	203.2	180.4	12	–	200	10100	10459	20	209.2	185.7
TOTAL STEEL (Kgs)		60820.8								53000								57521.4								64698							
TOTAL CONCRETE (cum)		1032.22								859.18								995.71								1197.34							

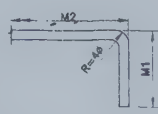
NOTES:

1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

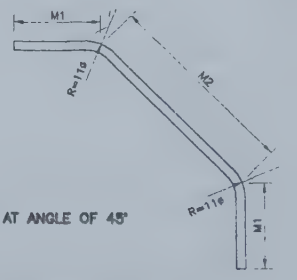
BENDING OF BARS

BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 11 OF 16)

DRG.NO. SD/109 (SHEET 12 OF 16)

SCHEDULE OF REINFORCEMENT

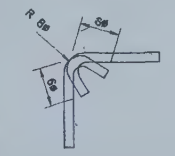
BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec — SHAPE OF BARS (NOT TO SCALE)	1/22/5								1/23/5							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	12	260	900	2500	4259	124	528.1	468.8	12	260	1200	2660	5019	124	622.3	552.5
②	M1 M2 M1	12	260	850	2550	4209	250	1052.2	934.2	16	260	930	3570	5375	250	1343.8	2120.9
③	M1 M2 M1	12	100	250	3500	3959	320	1266.8	1124.7	12	110	250	4360	5319	291	1547.8	1374.1
④	M1	BAR IS NOT USED								BAR IS NOT USED							
⑤	0.2m. M1 0.2m. M2	10	200	2550	700	3598	322	1158.7	714.4	10	200	3570	1380	5298	322	1706.1	1051.9
⑥	M1 M2 M1	12	120	200	2500	2859	267	763.3	677.7	12	150	200	2660	3019	214	646.0	573.5
⑦	M1	BAR IS NOT USED								BAR IS NOT USED							
⑧	M1 M2 M1	12	260	850	2500	4159	124	515.7	457.8	12	260	1170	2660	4959	124	614.9	545.9
⑨	M1 M2 MT	10	260	200	819	1172	248	290.6	179.2	10	260	200	961	1313	248	325.7	200.8
⑩	M1 M2 M1	10	260	200	890	1255	248	311.4	192.0	10	260	200	1003	1369	248	339.4	209.3
⑪	M1 M2 M1	10	250	160	31848	32134	16	514.1	317.0	10	250	160	31848	32134	16	514.1	317.0
⑫	M1 M2 M1	10	250	160	31848	32134	16	514.1	317.0	10	250	190	31848	32194	24	772.6	476.4
⑬	M1 M2 M1	10	250	160	31848	32134	16	514.1	317.0	10	250	190	31848	32194	24	772.6	476.4
⑭	M1 M2 M1	10	250	180	31848	32174	16	514.8	317.4	10	250	180	31848	32174	16	514.8	317.4
⑮	M1 M2 M1	10	250	180	31848	32174	12	386.1	238.0	10	250	180	31848	32174	24	772.2	476.1
⑯	M1 M2 M1	10	–	160	31848	32134	12	385.6	237.7	10	–	160	31848	32134	12	385.6	237.7
⑰	M1 M2 M1	10	–	160	31848	32134	2	64.3	39.6	10	–	160	31848	32134	2	64.3	39.6
⑱	M1 M2	10	150	150	500	1331	36	47.9	29.5	10	150	150	520	1371	38	52.1	32.1
⑲	M1 M2 M1	10	–	160	2500	2786	16	44.6	27.5	10	–	160	2660	2946	16	47.1	29.1
⑳	M1+0.2m M1 135° M2 0.2m.	10	150	1100	1556	4172	36	150.2	92.6	10	150	1100	1556	4172	38	158.5	97.7
㉑	M1 M2 M1	12	–	200	2500	2859	20	57.2	50.8	12	–	200	2660	3019	20	60.4	53.6
TOTAL STEEL (Kgs)		6732.9								9182.1							
TOTAL CONCRETE (cum)		110.86								165.70							

BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec — SHAPE OF BARS (NOT TO SCALE)	1/33/5								1/34/5							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	16	300	1350	3740	6385	108	689.6	1088.4	16	240	1700	3940	7285	134	976.2	1540.8
②	M1 M2 M1	16	300	1270	3820	6305	218	1374.5	2169.4	16	240	1370	4900	7585	272	2063.1	3256.3
③	M1 M2 M1	16	120	400	5240	5985	267	1598.0	2522.2	20	200	450	6540	7371	161	1186.8	2926.8
④	M1	BAR IS NOT USED								BAR IS NOT USED							
⑤	0.2m. M1 0.2m. M2	10	200	3820	1070	5238	322	1686.8	1040.0	10	200	4900	1720	6968	322	2243.9	1383.4
⑥	M1 M2 M1	20	280	320	3740	4311	115	495.8	1222.7	16	170	260	3940	4405	189	832.6	1314.1
⑦	M1	12	280	2100	–	2100	114	239.4	212.5	BAR IS NOT USED							
⑧	M1 M2 M1	16	300	1270	3740	6225	108	672.3	1081.1	16	240	1600	3940	7085	134	949.4	1498.5
⑨	M1 M2 MT	10	300	200	1158	1511	216	326.4	201.3	10	240	200	1342	1695	268	454.3	280.1
⑩	M1 M2 M1	10	300	200	1272	1637	216	353.7	218.0	10	240	200	1484	1849	268	495.6	305.6
⑪	M1 M2 M1	10	250	210	31848	32234	24	773.6	477.0	10	250	230	31848	32274	24	774.6	477.6
⑫	M1 M2 M1	10	250	210	31848	32234	24	773.6	477.0	10	200	260	31848	32334	40	1293.3	797.4
⑬	M1 M2 M1	10	250	210	31848	32234	24	773.6	477.0	10	250	260	31848	32334	32	1034.7	637.9
⑭	M1 M2 M1	10	250	250	31848	32314	24	775.5	478.1	10	220	280	31848	32374	28	906.5	558.9
⑮	M1 M2 M1	10	250	250	31848	32314	16	517.0	318.8	10	220	280	31848	32374	28	906.5	558.9
⑯	M1 M2 M1	10	–	160	31848	32134	12	385.6	237.7	10	–	160	31848	32134	12	385.6	237.7
⑰	M1 M2 M1	10	–	160	31848	32134	2	64.3	39.6	10	–	160	31848	32134	2	64.3	39.6
⑱	M1 M2	10	150	150	620	1571	52	81.7	50.4	10	150	150	650	1631	56	91.4	56.3
⑲	M1 M2 M1	10	–	160	3740	4026	16	64.4	39.7	10	–	160	3940	4226	16	67.6	41.7
⑳	M1+0.2m M1 135° M2 0.2m.	10	150	1100	1556	4172	52	216.9	133.8	10	150	1100	1556	4172	56	233.6	144.0
㉑	M1 M2 M1	12	–	200	3740	4099	20	82.0	72.8	12	–	200	3940	4299	20	86.0	76.3
TOTAL STEEL (Kgs)		12537.5								16131.9							
TOTAL CONCRETE (cum)		226.56								317.71							

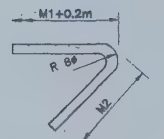
NOTES:

1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

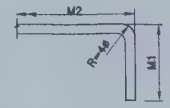
BENDING OF BARS



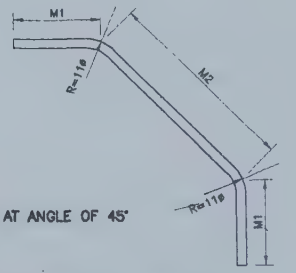
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 12 OF 16)

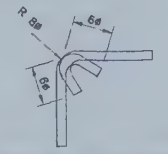
SCHEDULE OF REINFORCEMENT

BAR MARK	SHAPE OF BARS (NOT TO SCALE)	BOX – CELL DESIGNATION Nc/ab/Ec	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	1/43/5	16	260	1520	4900	7885	124	977.7	1543.2
		1/44/5	16	200	1800	5000	8545	161	1375.8	2171.4
		1/45/5	20	260	2150	5300	9531	124	1181.9	2914.7
		1/53/5	16	260	1620	6000	9185	124	1138.9	1797.6
②	M1 M2 M1	1/43/5	16	260	1850	4140	7385	250	1846.3	2914.0
		1/44/5	16	200	1700	5050	8395	324	2720.0	4293.1
		1/45/5	20	260	1850	6150	9781	250	2445.3	6030.6
		1/53/5	20	260	2000	4340	8271	250	2067.8	5099.6
③	M1 M2 M1	1/43/5	20	140	570	5500	6571	229	1504.8	3711.2
		1/44/5	25	200	550	7000	8014	161	1290.3	4971.9
		1/45/5	25	200	600	8300	9414	161	1515.7	5840.5
		1/53/5	25	170	670	6600	7854	189	1484.4	5720.1
④	M1	1/43/5	BAR IS NOT USED							
		1/44/5	BAR IS NOT USED							
		1/45/5	BAR IS NOT USED							
		1/53/5	BAR IS NOT USED							
⑤	0.2m. M1 0.2m. M2	1/43/5	10	200	4140	700	5188	322	1670.7	1030.0
		1/44/5	10	200	5050	1450	6848	322	2205.2	1359.6
		1/45/5	10	200	6150	2100	8598	322	2768.7	1707.0
		1/53/5	10	200	4340	750	5438	322	1751.2	1079.7
⑥	M1 M2 M1	1/43/5	20	160	320	4900	5471	200	1094.3	2698.6
		1/44/5	20	220	320	5000	5571	146	813.4	2006.0
		1/45/5	20	260	320	5300	5871	124	728.2	1795.5
		1/53/5	25	180	400	6000	6714	178	1195.1	4605.2
⑦	M1	1/43/5	BAR IS NOT USED							
		1/44/5	12	220	2800	–	2800	145	406.0	360.5
		1/45/5	12	260	2800	–	2800	123	344.4	305.8
		1/53/5	BAR IS NOT USED							
⑧	M2 M1 M1	1/43/5	16	260	1420	4900	7685	124	952.9	1504.1
		1/44/5	16	200	1650	5000	8245	161	1327.5	2095.2
		1/45/5	16	260	2000	5300	9245	124	1146.4	1809.4
		1/53/5	16	260	1520	6000	8985	124	1114.1	1758.5
⑨	M2 M1 M1	1/43/5	10	260	200	1484	1836	248	455.5	280.8
		1/44/5	10	200	200	1455	1808	322	582.2	359.0
		1/45/5	10	260	200	1738	2091	248	518.6	319.7
		1/53/5	10	260	200	1696	2049	248	508.1	313.2
⑩	M1 M2 M1	1/43/5	10	260	200	1625	1991	248	493.7	304.4
		1/44/5	10	200	200	1668	2033	322	654.7	403.6
		1/45/5	10	260	200	1950	2316	248	574.4	354.1
		1/53/5	10	260	200	1837	2203	248	546.3	336.8
⑪	M2 M1 M1	1/43/5	10	180	290	31848	32394	44	1425.3	878.8
		1/44/5	10	180	250	31848	32314	44	1421.8	876.6
		1/45/5	10	200	280	31848	32374	40	1294.9	798.4
		1/53/5	10	130	340	31848	32494	76	2469.5	1522.6
⑫	M2 M1 M1	1/43/5	10	200	250	31848	32314	30	969.4	597.7
		1/44/5	10	180	280	31848	32374	44	1424.4	878.2
		1/45/5	10	150	350	31848	32514	66	2145.9	1323.0
		1/53/5	10	200	280	31848	32374	30	971.2	598.8
⑬	M2 M1 M1	1/43/5	10	250	250	31848	32314	24	775.5	478.1
		1/44/5	10	220	280	31848	32374	36	1165.5	718.5
		1/45/5	10	180	350	31848	32514	56	1820.8	1122.6
		1/53/5	10	220	280	31848	32374	28	906.5	558.9
⑭	M2 M1 M1	1/43/5	10	180	340	31848	32494	44	1429.7	881.5
		1/44/5	10	200	330	31848	32474	40	1298.9	800.9
		1/45/5	10	180	350	31848	32514	44	1430.5	882.0
		1/53/5	10	160	390	31848	32594	62	2020.8	1245.9
⑮	M2 M1 M1	1/43/5	10	180	340	31848	32494	12	389.9	240.4
		1/44/5	10	200	330	31848	32474	24	778.4	480.5
		1/45/5	10	180	350	31848	32514	40	1300.5	801.8
		1/53/5	10	160	390	31848	32594	12	391.1	241.1
⑯	M2 M1 M1	1/43/5	10	–	160	31848	32134	12	385.6	237.7
		1/44/5	10	–	160	31848	32134	12	385.6	237.7
		1/45/5	10	–	160	31848	32134	12	385.6	237.7
		1/53/5	10	–	160	31848	32134	12	385.6	237.7
⑰	M2 M1 M1	1/43/5	10	–	160	31848	32134	4	128.5	79.2
		1/44/5	10	–	160	31848	32134	4	128.5	79.2
		1/45/5	10	–	160	31848	32134	4	128.5	79.2
		1/53/5	10	–	160	31848	32134	4	128.5	79.2
⑱	M1 M2	1/43/5	10	150	150	770	1871	68	127.3	78.5
		1/44/5	10	150	150	700	1731	70	121.2	74.7
		1/45/5	10	150	150	750	1831	74	135.5	83.6
		1/53/5	10	150	150	670	2071	82	169.8	104.7
⑲	M1 M1 M2	1/43/5	10	–	160	4900	5186	16	83.0	51.2
		1/44/5	10	–	160	5000	5286	16	84.6	52.1
		1/45/5	10	–	160	5300	5586	16	89.4	55.1
		1/53/5	10	–	160	6000	6286	16	100.6	62.0
⑳	M1+0.2m M1 135° M2 0.2m.	1/43/5	10	150	1100	1556	4172	68	283.7	174.9
		1/44/5	10	150	1100	1556	4172	70	292.0	180.1
		1/45/5	10	150	1100	1556	4172	74	308.7	190.3
		1/53/5	10	150	1100	1556	4172	82	342.1	210.9
㉑	M1 M2 M1	1/43/5	12	–	200	4900	5259	20	105.2	93.4
		1/44/5	12	–	200	5000	5359	20	107.2	95.2
		1/45/5	12	–	200	5300	5659	20	113.2	100.5
		1/53/5	12	–	200	6000	6359	20	127.2	112.9
TOTAL STEEL (Kgs)		1/43/5	17777.7							
		1/44/5	22494.1							
		1/45/5	26751.5							
		1/53/5	25685.6							
TOTAL CONCRETE (cum)		1/43/5	316.30							
		1/44/5	380.33							
		1/45/5	517.90							
		1/53/5	412.08							

NOTES:

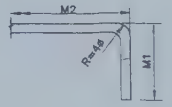
1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

BENDING OF BARS

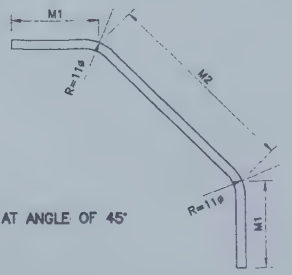


BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 13 OF 16)

DRG.NO. SD/109 (SHEET 14 OF 16)

SCHEDULE OF REINFORCEMENT

BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/54/5								1/55/5							
		BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M2 M1	16	240	1950	6100	9945	134	1332.6	2103.4	20	240	2270	6360	10831	134	1451.4	3579.4
②	M1 M2 M1	20	240	2050	5350	9381	272	2551.7	6292.9	20	240	2180	6370	10661	272	2899.9	7151.6
③	M1 M1 M2	25	160	700	7300	8614	200	1722.8	6638.7	28	200	720	8760	10104	161	1626.7	7863.0
④	M1	BAR IS NOT USED								BAR IS NOT USED							
⑤	0.2m. M1 3.2m. M2	10	200	5350	1100	6798	322	2189.1	1349.7	10	200	6370	1830	8548	322	2752.6	1697.1
⑥	M1 M2 M1	25	260	400	6100	6814	124	845.0	3255.9	25	260	400	6360	7074	124	877.2	3380.2
⑦	M1	16	260	3500	–	3500	123	430.5	679.5	12	260	3500	–	3500	123	430.5	382.2
⑧	M1 M2 M1	20	240	1800	6100	9831	134	1290.6	3182.8	20	240	2100	6360	10491	134	1405.8	3467.0
⑨	M2 M1 M1	10	240	200	1738	2091	268	560.4	345.5	10	240	200	1922	2275	268	609.7	375.9
⑩	M1 M2 M1	10	240	200	1950	2316	268	620.7	382.7	10	240	200	2162	2528	268	677.5	417.7
⑪	M2 M1 M1	12	200	330	31848	32467	50	1623.3	1441.2	10	150	330	31848	32474	66	2143.3	1321.4
⑫	M2 M1 M1	10	160	300	31848	32414	50	1620.7	999.2	10	140	370	31848	32554	70	2278.8	1404.9
⑬	M2 M1 M1	10	200	300	31848	32414	40	1296.5	799.4	10	180	370	31848	32554	56	1823.0	1124.0
⑭	M2 M1 M1	10	160	400	31848	32614	62	2022.0	1246.7	10	150	410	31848	32634	86	2153.8	1327.9
⑮	M2 M1 M1	10	160	400	31848	32614	20	652.3	402.2	10	150	410	31848	32634	36	1174.8	724.3
⑯	M2 M1 M1	10	–	160	31848	32134	12	385.6	237.7	10	–	160	31848	32134	12	385.6	237.7
⑰	M2 M1 M1	10	–	160	31848	32134	4	128.5	79.2	10	–	160	31848	32134	4	128.5	79.2
⑱	M1 M2	10	150	150	850	2031	84	170.6	105.2	10	150	150	850	2031	84	170.8	110.2
⑲	M1 M1 M2	10	–	160	6100	6386	16	102.2	63.0	10	–	160	6360	6646	16	106.3	65.6
⑳	M1+0.2m M1 1.35 M2 0.2m	10	150	1100	1556	4172	84	350.4	216.1	10	150	1100	1556	4172	85	367.1	226.3
㉑	M1 M1 M2	12	–	200	6100	6459	20	129.2	114.7	12	–	200	6360	6719	20	134.4	119.3
TOTAL STEEL (Kgs)		29935.6								35055.0							
TOTAL CONCRETE (cum)		482.70								611.85							

BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	1/63/5								1/64/5							
		BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M2 M1	16	220	1750	7240	10685	146	1560.0	2462.2	20	260	2100	7300	11431	124	1417.5	3495.7
②	M1 M2 M1	20	220	2420	4620	9391	296	2779.8	6855.5	20	260	2450	5650	10481	250	2620.3	6462.1
③	M1 M1 M2	32	280	800	7840	9330	115	1073.0	6774.0	25	140	850	7900	9514	229	2178.7	8395.5
④	M1	16	280	4200	–	4200	114	478.8	755.7	BAR IS NOT USED							
⑤	0.2m. M1 3.2m. M2	12	200	4620	870	5828	322	1876.7	1666.1	12	200	5650	900	6888	322	2218.0	1969.2
⑥	M1 M2 M1	28	250	450	7240	8044	129	1037.7	5015.7	28	260	450	7300	8104	124	1004.9	4857.2
⑦	M1	16	250	4200	–	4200	128	537.6	848.5	16	260	4200	–	4200	123	516.6	815.4
⑧	M1 M2 M1	16	220	1670	7240	10525	146	1536.7	2425.4	20	260	1950	7300	11131	124	1380.3	3404.0
⑨	M2 M1 M1	10	220	200	2078	2430	292	709.7	437.5	10	260	200	2092	2445	248	608.2	373.8
⑩	M1 M2 M1	10	220	200	2191	2556	292	746.5	460.2	10	260	200	2304	2669	248	662.0	408.2
⑪	M2 M1 M1	12	160	410	31848	32627	74	2414.4	2143.5	12	160	400	31848	32607	74	2412.9	2142.2
⑫	M2 M1 M1	12	220	340	31848	32487	28	909.6	807.6	12	220	350	31848	32507	36	1170.2	1039.0
⑬	M2 M1 M1	10	180	340	31848	32494	32	1039.8	641.1	10	180	350	31848	32514	44	1430.6	882.0
⑭	M2 M1 M1	12	200	450	31848	32707	60	1962.4	1742.3	12	180	480	31848	32767	66	2162.6	1920.0
⑮	M2 M1 M1	12	200	450	31848	32707	12	392.5	348.5	12	180	480	31848	32767	12	393.2	349.1
⑯	M2 M1 M1	12	–	200	31848	32207	12	386.5	343.1	12	–	200	31848	32207	12	386.5	343.1
⑰	M2 M1 M1	10	–	160	31848	32134	4	128.5	79.2	10	–	160	31848	32134	6	192.8	118.9
⑱	M1 M2	10	150	150	1020	2371	100	237.1	146.2	10	150	150	1000	2331	100	233.1	143.7
⑲	M1 M1 M2	10	–	160	7240	7526	16	120.4	74.2	10	–	160	7300	7586	16	121.4	74.8
⑳	M1+0.2m M1 1.35 M2 0.2m	10	150	1100	1556	4172	100	417.2	257.2	10	150	1150	1626	4343	100	434.3	267.7
㉑	M1 M1 M2	12	–	200	7240	7599	20	152.0	134.9	12	–	200	7300	7659	20	153.2	136.0
TOTAL STEEL (Kgs)		34418.8								37597.7							
TOTAL CONCRETE (cum)		562.31								624.30							

NOTES:

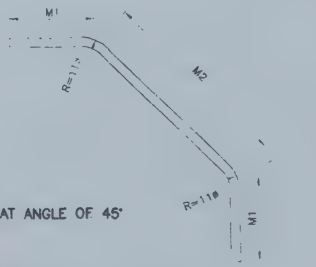
1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

BENDING OF BARS

BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°

BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 14 OF 16)

DRG.NO. SD/109 (SHEET 15 OF 16)

SCHEDULE OF REINFORCEMENT

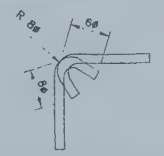
BAR MARK	SHAPE OF BARS (NOT TO SCALE) / BOX – CELL DESIGNATION Nc/ab/Ec	1/65/5								1/66/5							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	25	260	2450	7400	12214	124	1514.6	5836.1	20	240	2800	7800	13331	134	1786.4	4405.5
②	M1 M2 M1	20	260	2500	6670	11601	250	2900.3	7152.7	25	240	2700	7700	13014	272	3539.9	13640.4
③	M1 M2 M1	32	220	900	9100	10790	146	1575.4	9945.8	28	150	950	10300	12104	214	2590.2	12520.3
④	M1	BAR IS NOT USED								BAR IS NOT USED							
⑤	0.2m. M1 0.2m. M2	10	200	6670	1500	8518	322	2743.0	1691.1	10	200	7700	2100	10148	322	3267.8	2014.7
⑥	M2 M1 M1	28	260	450	7400	8204	124	1017.3	4917.2	25	240	400	7800	8514	134	1140.9	4396.3
⑦	M1	16	260	4200	–	4200	123	516.6	815.4	16	240	4200	–	4200	133	558.6	881.7
⑧	M2 M1 M1	20	260	2220	7400	11771	124	1459.6	3599.7	20	240	2500	7800	12731	134	1706.0	4207.3
⑨	M2 M1 M1	10	260	200	2120	2473	248	613.3	378.1	10	240	200	2375	2727	268	730.9	450.6
⑩	M1 M2 M1	10	260	200	2445	2811	248	697.1	429.8	10	240	200	2799	3164	268	848.1	522.9
⑪	M2 M1 M1	12	160	390	31848	32587	74	2411.4	2140.9	12	180	380	31848	32567	66	2149.4	1908.3
⑫	M2 M1 M1	12	200	380	31848	32567	50	1628.3	1445.7	12	150	480	31848	32767	78	2555.8	2269.1
⑬	M2 M1 M1	10	170	380	31848	32574	58	1889.3	1164.8	12	180	480	31848	32767	66	2162.6	1920.0
⑭	M2 M1 M1	12	180	500	31848	32807	66	2165.2	1922.3	12	170	530	31848	32867	70	2300.7	2042.6
⑮	M2 M1 M1	12	180	500	31848	32807	24	787.4	699.0	12	170	530	31848	32867	36	1183.2	1050.5
⑯	M2 M1 M1	10	–	160	31848	32134	12	385.6	237.7	10	–	160	31848	32134	12	385.6	237.7
⑰	M2 M1 M1	10	–	160	31848	32134	6	192.8	118.9	10	–	160	31848	32134	6	192.8	118.9
⑱	M1 M2	10	150	150	970	2271	102	231.7	142.8	10	150	150	950	2231	108	236.5	145.8
⑲	M1 M2 M1	10	–	160	7400	7686	16	123.0	75.8	10	–	160	7800	8086	16	129.4	79.8
⑳	M1+0.2m M1 135° M2 0.2m.	10	150	1200	1697	4513	102	460.4	283.8	10	150	1250	1768	4684	106	496.5	306.1
㉑	M1 M2 M1	12	–	200	7400	7759	20	155.2	137.8	12	–	200	7800	8159	20	183.2	144.9
TOTAL STEEL (Kgs)		43135.5								53263.2							
TOTAL CONCRETE (cum)		732.06								917.77							

BAR MARK	SHAPE OF BARS (NOT TO SCALE) / BOX – CELL DESIGNATION Nc/ab/Ec	1/75/5								1/76/5							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	20	260	2600	8500	13631	124	1690.3	4168.5	20	240	2900	8700	14431	134	1933.8	4769.0
②	M1 M2 M1	25	260	2850	6970	12584	250	3146.0	12122.9	25	240	2950	7920	13734	272	3735.7	14395.0
③	M1 M2 M1	28	140	1050	9300	11304	229	2588.6	12512.3	28	140	1050	10900	12904	229	2955.0	14283.4
④	M1	BAR IS NOT USED								BAR IS NOT USED							
⑤	0.2m. M1 0.2m. M2	12	150	6970	1100	8408	428	3598.7	3195.0	12	150	7920	1900	10158	428	4347.7	3860.0
⑥	M2 M1 M1	28	220	450	8500	9304	146	1358.4	6565.9	28	220	450	8700	9504	146	1387.6	6707.0
⑦	M1	16	220	4900	–	4900	145	710.5	1121.4	16	220	4900	–	4900	145	710.5	1121.4
⑧	M2 M1 M1	20	260	2370	8500	13171	124	1633.2	4027.8	20	240	2620	8700	13871	134	1858.8	4584.0
⑨	M2 M1 M1	10	260	200	2403	2756	248	683.4	421.3	10	240	200	2474	2826	268	757.4	467.0
⑩	M1 M2 M1	10	260	200	2728	3094	248	767.2	473.0	10	240	200	2869	3235	268	867.0	534.5
⑪	M2 M1 M1	12	140	460	31848	32727	98	3207.2	2847.4	12	140	440	31848	32687	98	3203.3	2843.9
⑫	M2 M1 M1	12	160	400	31848	32607	62	2021.6	1794.8	12	150	450	31848	32707	78	2551.1	2264.9
⑬	M2 M1 M1	10	160	400	31848	32614	62	2022.0	1246.7	12	200	450	31848	32707	60	1962.4	1742.3
⑭	M2 M1 M1	12	160	580	31848	32967	86	2835.1	2517.1	12	160	580	31848	32967	86	2835.1	2517.1
⑮	M2 M1 M1	12	160	580	31848	32967	16	527.5	468.3	12	160	580	31848	32967	32	1054.9	936.6
⑯	M2 M1 M1	10	–	160	31848	32134	12	385.6	237.7	10	–	160	31848	32134	12	385.6	237.7
⑰	M2 M1 M1	10	–	160	31848	32134	6	192.8	118.9	10	–	160	31848	32134	6	192.8	118.9
⑱	M1 M2	10	150	150	1120	2571	116	298.3	183.9	10	150	150	1070	2471	118	291.6	179.8
⑲	M1 M2 M1	10	–	160	8500	8786	16	140.6	86.7	10	–	160	8700	8986	16	143.8	88.6
⑳	M1+0.2m M1 135° M2 0.2m.	10	150	1350	1909	5025	116	583.0	359.4	10	150	1350	1909	5025	118	593.0	365.6
㉑	M1 M2 M1	12	–	200	8500	8859	20	177.2	157.3	12	–	200	8700	9059	20	181.2	160.9
TOTAL STEEL (Kgs)		54626.4								62177.7							
TOTAL CONCRETE (cum)		870.79								1011.87							

NOTES:

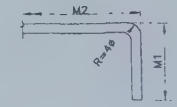
1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

BENDING OF BARS

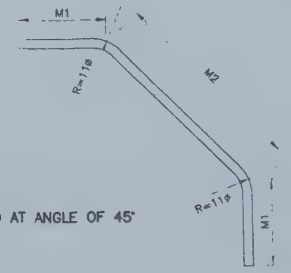


BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

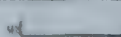
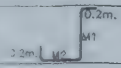
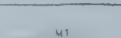
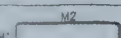
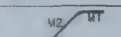
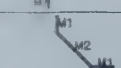
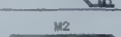
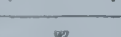
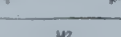
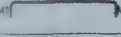
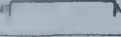
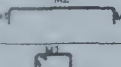
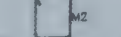
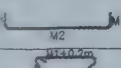
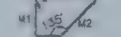
SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/109 (SHEET 15 OF 16)

DRG.NO. SD/109 (SHEET 16 OF 16)

SCHEDULE OF REINFORCEMENT

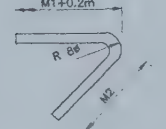
BAR MARK	SHAPE OF BARS (NOT TO SCALE)	BOX – CELL DESIGNATION Nc/ab/Ec	1/77/5								1/85/5								1/86/5								1/87/5							
			BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①			25	250	3250	9100	15514	129	2001.3	7711.8	20	250	2750	9700	15131	129	1951.9	4813.8	20	220	3050	9900	15931	146	2326.0	5736.2	25	250	3450	10200	17014	129	2194.8	8457.5
②			25	250	3150	9000	15214	260	3955.7	15242.7	25	250	3250	7300	13714	260	3565.7	13739.9	25	220	3350	8250	14864	296	4399.8	16954.0	25	250	3500	9350	16264	260	4228.7	16294.7
③			28	140	1100	12100	14204	229	3252.7	15722.4	32	160	1200	10300	12590	200	2518.0	15897.2	32	160	1200	11100	13390	200	2678.0	16907.3	28	120	1300	12400	14904	257	3979.3	19234.8
④			BAR IS NOT USED								BAR IS NOT USED								BAR IS NOT USED								BAR IS NOT USED							
⑤			12	150	9000	2500	11838	428	5066.7	4498.3	12	150	7300	1100	8738	428	3739.9	3320.4	12	150	8250	1500	10088	428	4317.7	3833.4	12	150	9350	2150	11838	428	5066.7	4498.3
⑥			28	250	450	9100	9904	129	1277.6	6175.5	32	240	520	9700	10630	134	1424.4	8993.0	32	260	520	9900	10830	124	1342.9	8478.4	32	280	520	10200	11130	115	1280.0	8080.9
⑦			16	250	4900	–	4900	128	627.2	989.9	20	240	5600	–	5600	133	744.8	1836.8	20	260	5600	–	5600	123	688.8	1698.7	20	280	5600	–	5600	114	638.4	1574.4
⑧			25	250	2950	9100	14914	129	1923.9	7413.6	20	250	2550	9700	14731	129	1900.3	4686.5	20	220	2800	9900	15431	146	2253.0	5556.2	25	250	3100	10200	16314	129	2104.5	8109.5
⑨			18	250	200	2799	3152	258	813.1	501.3	10	250	200	2799	3152	258	813.1	501.3	10	220	200	2869	3222	292	940.9	580.1	10	250	200	3082	3434	258	886.1	546.3
⑩			10	250	200	3223	3589	258	925.9	570.8	10	250	200	3082	3447	258	889.4	548.3	10	220	200	3223	3589	292	1047.9	646.1	10	250	200	3576	3942	258	1017.1	627.1
⑪			12	160	450	31848	32707	86	2812.8	2497.2	12	120	550	31848	32907	132	4343.7	3856.4	12	120	530	31848	32867	132	4338.4	3851.7	12	130	530	31848	32867	122	4009.7	3559.9
⑫			12	130	550	31848	32907	106	3488.1	3096.8	12	150	450	31848	32707	66	2158.6	1916.5	12	140	500	31848	32807	84	2755.8	2446.6	12	130	580	31848	32967	106	3494.5	3102.5
⑬			12	160	550	31848	32907	86	2830.0	2512.5	12	200	450	31848	32707	50	1635.3	1451.9	12	180	500	31848	32807	66	2165.2	1922.3	12	160	580	31848	32967	86	2835.1	2517.1
⑭			12	150	600	31848	33007	92	3036.6	2696.0	12	140	650	31848	33107	112	3708.0	3292.0	12	140	650	31848	33107	112	3708.0	3292.0	12	130	700	31848	33207	122	4051.2	3596.7
⑮			12	150	600	31848	33007	44	1452.3	1289.4	12	140	650	31848	33107	12	397.3	352.7	12	140	650	31848	33107	20	662.1	587.9	12	130	700	31848	33207	40	1328.3	1179.3
⑯			10	–	160	31848	32134	12	385.6	237.7	10	–	160	31848	32134	12	385.6	237.7	10	–	160	31848	32134	12	385.6	237.7	10	–	160	31848	32134	12	385.6	237.7
⑰			10	–	160	31848	32134	6	192.8	118.9	10	–	160	31848	32134	8	257.1	158.5	10	–	160	31848	32134	8	257.1	158.5	10	–	160	31848	32134	8	257.1	158.5
⑱			10	150	150	1100	2531	124	313.9	193.5	10	150	150	1300	2931	132	386.9	238.6	10	150	150	1250	2831	134	379.4	233.9	10	150	150	1250	2831	138	390.7	240.9
⑲			10	–	160	9100	9386	16	150.2	92.6	10	–	160	9700	9986	16	159.8	98.5	10	–	160	9900	10186	16	163.0	100.5	10	–	160	10200	10486	16	167.8	103.4
⑳			10	150	1400	1980	5186	124	644.3	397.3	10	150	1500	2121	5538	132	731.0	4550.7	10	150	1500	2121	5538	134	742.0	457.5	10	150	1500	2263	5878	138	811.3	500.2
㉑			12	–	200	9100	9459	20	189.2	168.0	12	–	200	9700	10059	20	201.2	1778.8	12	–	200	9900	10259	20	205.2	182.2	12	–	200	10200	10559	20	211.2	187.5
TOTAL STEEL (Kgs)			72126.2								66569.3								73861.2								82807.1							
TOTAL CONCRETE (cum)			1243.88								1084.93								1205.93								1442.27							

NOTES:

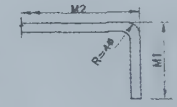
1. FOR ALL NOTES REFER DRG. NO. SD/109 (SHEET 2 OF 16).

BENDING OF BARS

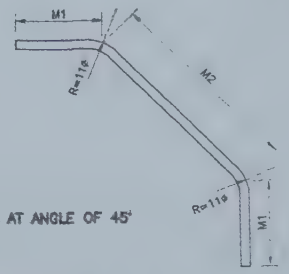
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

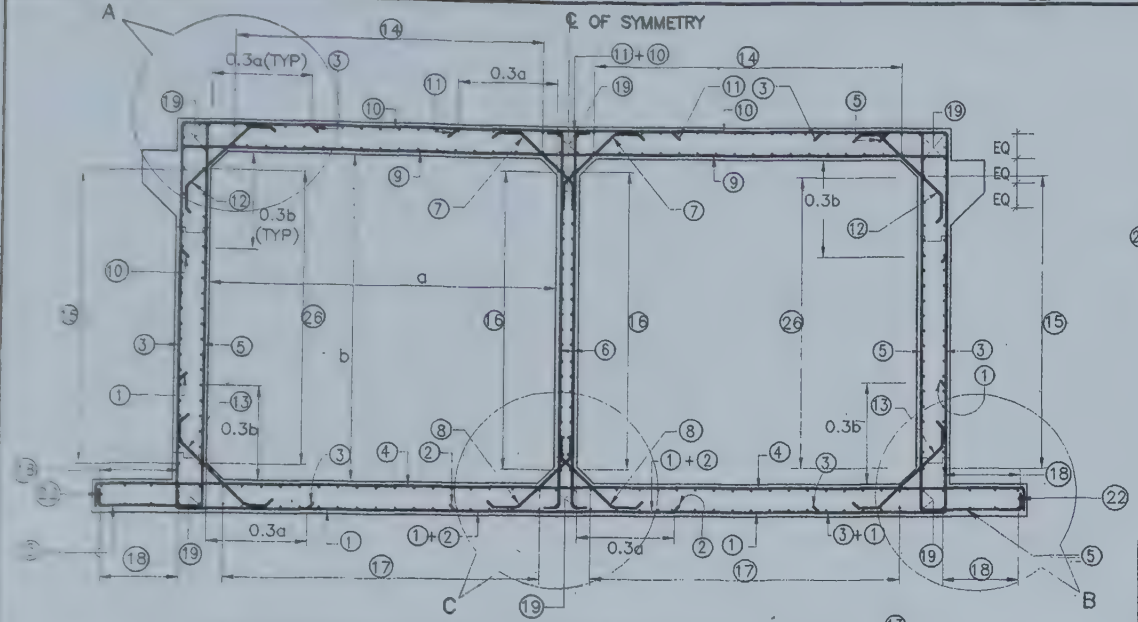
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

SINGLE CELL BOX CULVERT
2m x 2m TO 8m x 7m
(WITH EARTH CUSHION)

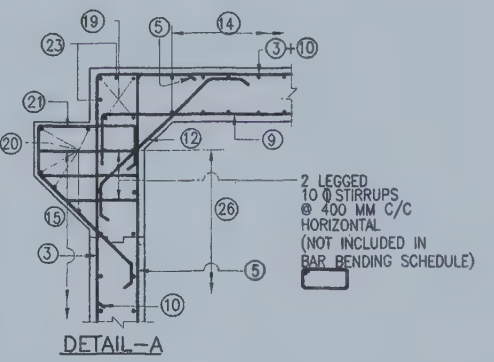
BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E. (R) S&R MOST	DRG. NO. SD/109 (SHEET 16 OF 16)

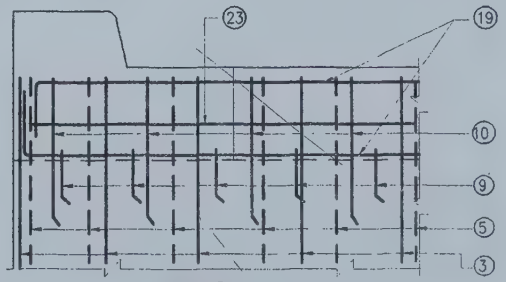
DRG.NO. SD/110 (SHEET 1 OF 2)



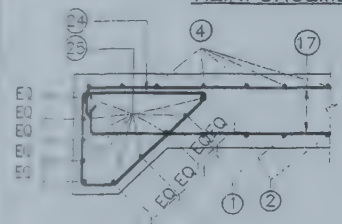
REINFORCEMENT DETAILS OF DOUBLE CELL BOX CULVERT



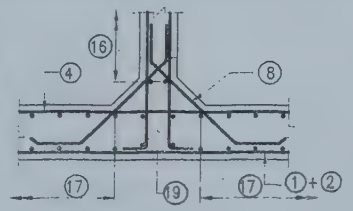
DETAIL–A



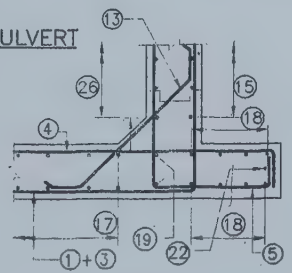
VIEW 2–2
(HAUNCH LINES NOT SHOWN)



SECTION 1–1



DETAIL– C



DETAIL–B

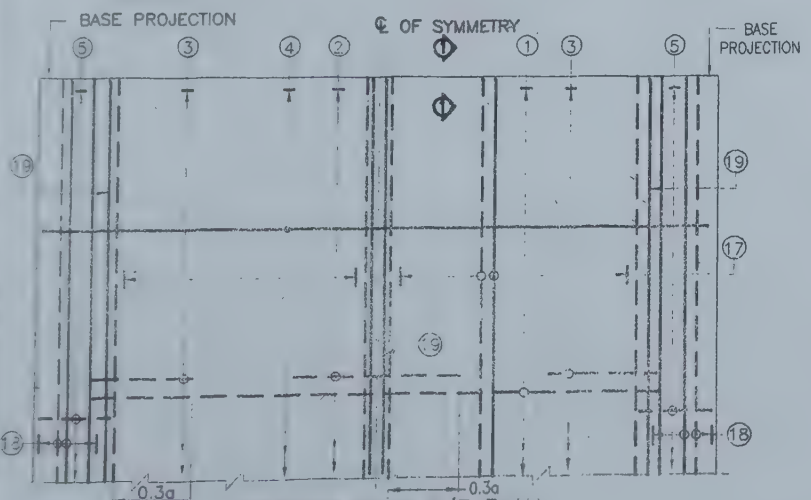
NOTES:

1. FOR GENERAL NOTES REFER DRG. NO. SD/101.
2. FOR GENERAL ARRANGEMENT REFER DRG. NO. SD/104.
3. FOR BAR BENDING SCHEDULE REFER DRAWING NO. SD/110 (SHEET 2 OF 2)
4. FOR LAP ZONES REFER DRAWING NO SD/117 (SHEET 2 OF 2)

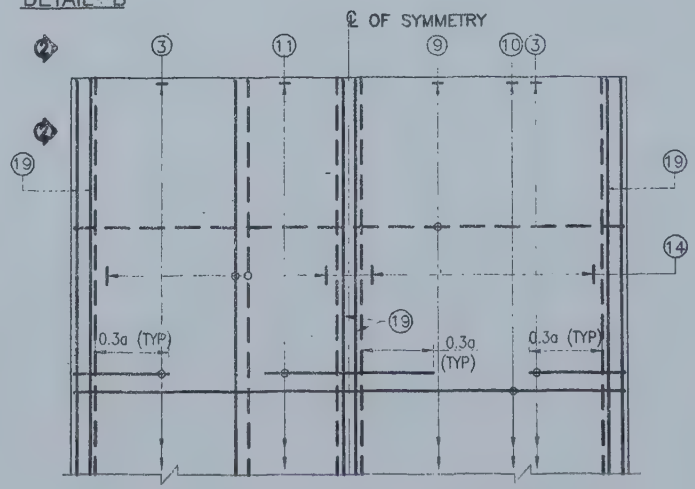
LEGEND :

TOP FACE BARS/ OUTER FACE BARS

BOTTOM FACE BARS/ INNER FACE BARS



BOTTOM SLAB R/F PLAN
(HAUNCH LINES NOT SHOWN IN PLAN)



TOP SLAB R/F PLAN
(BAR MARK ⑤, ㉓ KERB LINES & HAUNCH LINES NOT SHOWN IN PLAN)

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DOUBLE CELL R.C.C BOX CULVERTS (WITHOUT EARTH CUSHION)

TYPICAL REINFORCEMENT DETAILS

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/110 (SHEET 1 OF 2)

SCHEDULE OF REINFORCEMENT

DRG.NO. SD/110 (SHEET 2 OF 2)

BAR MARK	SHAPE OF BARS (NOT TO SCALE)	BOX – CELL DESIGNATION Nc/ab/Ec	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
		2/22/0								
①	M1 M2 M1		10	200	950	4940	6806	61	415.1	256.0
②	M1		10	200	1500	–	1500	60	90.0	55.5
③	M1 M2 M1		12	200	920	2700	4499	122	548.9	487.3
④	M2 M1 M1		12	150	300	5540	6099	81	494.0	438.6
⑤	0.2m M1 M2 0.2m		12	125	2700	570	3608	194	700.0	621.5
⑥	M2 M1 M1		16	200	260	2700	3185	122	386.1	609.5
⑦	M2 M1 M1 M2		12	200	200	961	1304	122	159.1	141.2
⑧	M1 M2 M1 M2 M1		12	200	200	961	1304	122	159.1	141.2
⑨	M1 M2 M1		12	125	200	4940	5299	97	514.0	456.3
⑩	M1 M2 M1		10	200	950	4940	6806	61	415.1	256.0
⑪	M1		16	200	1500	–	1500	60	90.0	142.1
⑫	M2 M1 M1 M2 M1		12	200	200	1060	1403	122	171.2	152.0
⑬	M2 M1 M1 M2 M1		12	200	200	1060	1403	122	171.2	152.0
⑭	M2 M1 M1		8	150	250	11900	12373	52	643.4	253.9
⑮	M2 M1 M1		8	150	185	11900	12243	26	318.3	125.6
⑯	M2 M1 M1		8	150	150	11900	12173	26	316.5	124.9
⑰	M2 M1 M1		8	150	200	11900	12273	52	638.2	251.8
⑱	M2 M1 M1		8	150	200	11900	12273	12	147.3	58.1
⑲	M2 M1 M1		10	–	160	11900	12186	16	195.0	120.2
⑳	M1		12	–	11900	–	11900	10	119.0	105.7
㉑	M1 M2		12	200	1006	1268	2274	122	277.4	268.3
㉒	M1 M1 M2		10	–	160	11900	12186	2	24.3	15.0
㉓	M1 M1 M2		10	–	160	11900	12186	4	48.7	30.1
㉔	M1+0.2m M1 M2 0.2m		10	150	1100	1556	4207	76	319.7	197.1
㉕	M1 M1 M2		10	–	160	5540	5826	20	116.5	71.8
㉖	M2 M1 M2		10	250	185	11900	12236	16	195.8	120.7
TOTAL STEEL (Kgs)									5650	
TOTAL CONCRETE (cum)									91	

BAR MARK	SHAPE OF BARS (NOT TO SCALE)	2/23/0	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1		10	200	1270	5000	7506	61	457.8	282.3
②	M1		10	200	1500	–	1500	60	90.0	55.5
③	M1 M2 M1		16	200	950	3720	5565	122	678.9	1071.6
④	M2 M1 M1		12	125	320	5600	6199	97	601.3	533.8
⑤	0.2m M1 M2 0.2m		12	175	3720	600	4658	138	642.8	570.7
⑥	M2 M1 M1		16	200	260	3720	4185	122	510.6	805.9
⑦	M2 M1 M1 M2		12	200	200	961	1304	122	159.1	141.2
⑧	M1 M2 M1 M2 M1		12	200	200	989	1332	122	162.5	144.3
⑨	M1 M2 M1		12	125	200	5000	5359	97	519.8	461.5
⑩	M1 M2 M1		12	200	1250	5000	7459	61	455.0	403.9
⑪	M1		16	200	1500	–	1500	60	90.0	142.1
⑫	M2 M1 M1 M2 M1		12	200	200	1102	1445	122	176.3	156.6
⑬	M2 M1 M1 M2 M1		12	200	200	1130	1474	122	179.8	159.6
⑭	M2 M1 M1		10	150	250	11900	12366	52	643.0	396.4
⑮	M2 M1 M1		10	150	200	11900	12266	38	466.1	287.4
⑯	M2 M1 M1		10	150	160	11900	12186	38	463.1	285.5
⑰	M2 M1 M1		10	150	210	11900	12286	52	638.9	393.9
⑱	M2 M1 M1		10	150	210	11900	12286	12	147.4	90.9
⑲	M2 M1 M1		10	–	160	11900	12186	16	195.0	120.2
⑳	M1		12	–	11900	–	11900	10	119.0	105.7
㉑	M1 M2		12	200	1006	1268	2274	122	277.4	246.3
㉒	M1 M1 M2		10	–	160	11900	12186	2	24.4	15.0
㉓	M1 M1 M2		10	–	160	11900	12186	4	48.7	30.1
㉔	M1+0.2m M1 M2 0.2m		10	150	1100	1556	4207	78	328.1	202.3
㉕	M1 M1 M2		10	–	160	5600	5886	20	117.7	72.6
㉖	M2 M1 M2		10	250	200	11900	12266	24	294.4	181.5
TOTAL STEEL (Kgs)									7377	
TOTAL CONCRETE (cum)									108	

BAR MARK	SHAPE OF BARS (NOT TO SCALE)	2/32/0	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1		10	200	1000	7000	8966	61	546.9	337.2
②	M1		10	200	2100	–	2100	60	126.0	77.7
③	M1 M2 M1		16	200	1250	2800	5245	122	639.9	1010.0
④	M2 M1 M1		16	200	350	7600	8245	61	502.9	793.8
⑤	0.2m M1 M2 0.2m		12	125	2850	600	3738	194	725.2	643.9
⑥	M2 M1 M1		12	125	200	2800	3159	194	612.8	544.1
⑦	M2 M1 M1 M2		12	200	200	1031	1375	122	167.7	148.9
⑧	M1 M2 M1 M2 M1		12	200	200	1031	1375	122	167.7	148.9
⑨	M1 M2 M1		16	200	260	7000	7465	61	455.4	718.7
⑩	M1 M2 M1		12	200	1000	7000	8959	61	546.5	485.2
⑪	M1		16	200	2100	–	2100	60	126.0	198.9
⑫	M2 M1 M1 M2 M1		12	200	200	1173	1516	122	185.0	164.2
⑬	M2 M1 M1 M2 M1		12	200	200	1173	1516	122	185.0	164.2
⑭	M2 M1 M1		10	150	250	11900	12366	76	939.8	579.4
⑮	M2 M1 M1		10	150	200	11900	12266	26	318.9	196.6
⑯	M2 M1 M1		10	150	160	11900	12186	26	316.8	195.3
⑰	M2 M1 M1		10	150	225	11900	12316	76	936.0	577.1
⑱	M2 M1 M1		10	150	225	11900	12316	12	147.8	91.1
⑲	M2 M1 M1		10	–	160	11900	12186	16	195.0	120.2
⑳	M1		12	–	11900	–	11900	10	119.0	105.7
㉑	M1 M2		12	200	1006	1268	2274	122	277.4	268.3
㉒	M1 M1 M2		10	–	160	11900	12186	2	24.4	15.0
㉓	M1 M1 M2		10	–	160	11900	12186	4	48.7	30.1
㉔	M1+0.2m M1 M2 0.2m		10	150	1100	1556	4207	104	437.5	269.8
㉕	M1 M1 M2		10	–	160	7600	7886	20	157.7	97.2
㉖	M2 M1 M2		10	250	200	11900	12266	16	196.3	121.0
TOTAL STEEL (Kgs)									8103	
TOTAL CONCRETE (cum)									125	

BAR MARK	SHAPE OF BARS (NOT TO SCALE)	2/33/0	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1		10	200	1300	7090	9656	61	589.0	363.1
②	M1		10	200	2150	–	2150	60	129.0	79.5
③	M1 M2 M1		16	200	1270	3820	6305	122	769.2	1214.1
④	M2 M1 M1		16	200	350	7690	8335	61	508.4	802.5
⑤	0.2m M1 M2 0.2m		20	200	3820	620	4737	122	577.9	1425.2
⑥	M2 M1 M1		16	200	260	3820	4285	122	522.8	825.1
⑦	M2 M1 M1 M2		12	200	200	1130	1474	122	179.8	159.6
⑧	M1 M2 M1 M2 M1		12	200	200	1102	1445	122	176.3	156.6
⑨	M1 M2 M1		16	200	260	7090	7555	61	460.9	727.4
⑩	M1 M2 M1		12	200	1320	7090	9689	61	591.0	524.7
⑪	M1		20	200	2150	–	2150	60	129.0	310.1
⑫	M2 M1 M1 M2 M1		12	200	200	1229	1573	122	191.9	170.3
⑬	M2 M1 M1 M2 M1		12	200	200	1201	1544	122	188.4	167.3
⑭	M2 M1 M1		10	150	250	11900	12366	76	939.8	579.4
⑮	M2 M1 M1		10	150	210	11900	12286	38	466.9	287.8
⑯	M2 M1 M1		10	150	160	11900	12186	38	463.1	285.5
⑰	M2 M1 M1		10	150	225	11900	12316	76	936.0	577.1
⑱	M2 M1 M1		10	150	225	11900	12316	12	147.8	91.1
⑲	M2 M1 M1		10	–	160	11900	12186	16	195.0	120.2
⑳	M1		12	–	11900	–	11900	10	119.0	105.7
㉑	M1 M2		12	200	1006	126	2274	122	277.4	310.7
㉒	M1 M1 M2		10	–	160	11900	12186	2	24.4	15.0
㉓	M1 M1 M2		10	–	160	11900	12186	4	48.7	30.1
㉔	M1+0.2m M1 M2 0.2m		10	150	1100	1556	4207	106	445.9	274.9
㉕	M1 M1 M2		10	–	160	7690	7976	20	159.5	98.3
㉖	M2 M1 M2		10	250	210	11900	12286	24	294.9	181.8
TOTAL STEEL (Kgs)									9850	
TOTAL CONCRETE (cum)									144	

NOTES:

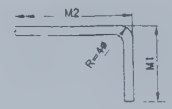
1. JOINT OR LAPPING OF BARS SHALL BE SUITABLY STAGGERED AS PER CLAUSE 304.6 OF IRC:21–1987.
2. FULL SCALE ELEVATION FOR THE BARS SHALL BE LINED OUT ON A PLAIN PLASTERED FLOOR TO THE DIMENSIONS SHOWN ON THE DRAWING SO AS TO GET CORRECT CLEARANCE BETWEEN DIFFERENT BARS AND THEN THE BARS SHALL BE BENT TO PROPER SHAPE.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING No. SD/110 (SHEET 1 OF 2).
4. QUANTITY OF CONCRETE DOES NOT INCLUDE RAILINGS
5. QUANTITY OF STEEL DOES NOT INCLUDE 5% EXTRA FOR WASTAGE AND LAPS.
6. BAR No.21 IS DETAILED AS BELOW:

BENDING OF BARS

BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°

BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

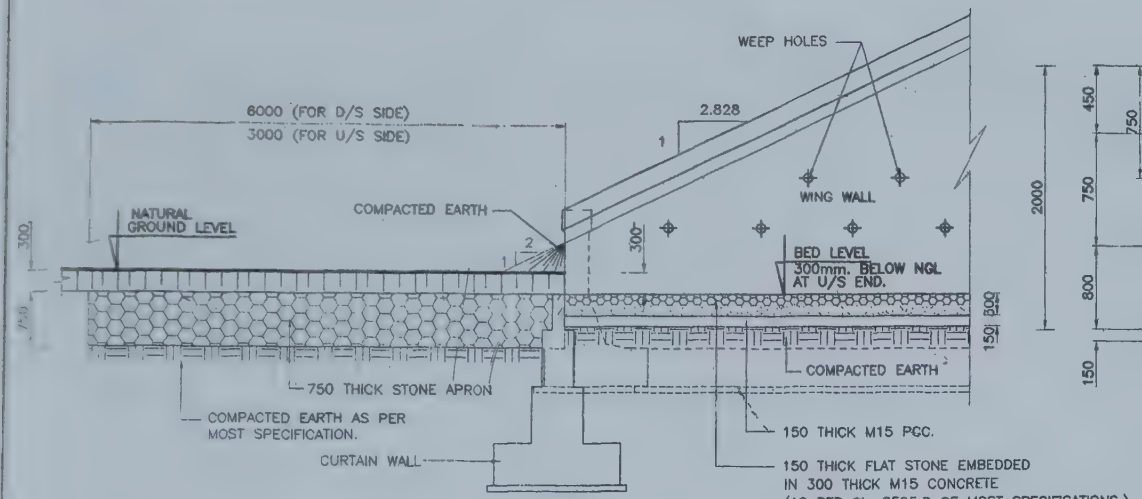
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DOUBLE CELL R.C.C BOX CULVERTS
2m x 2m TO 3m x3m
(WITHOUT EARTH CUSHION)

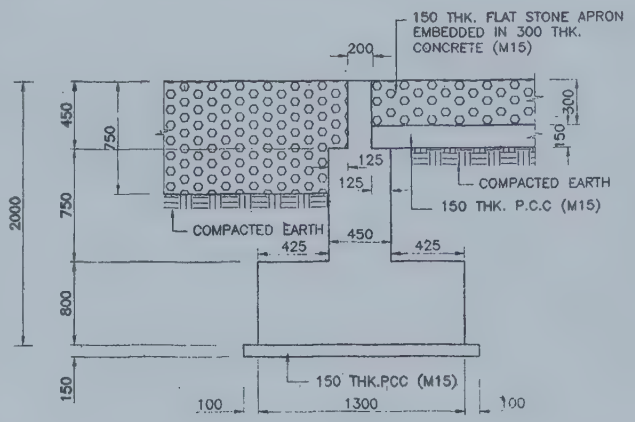
BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/110 (SHEET 2 OF 2)

DRG.NO. SD/111 (SHEET 1 OF 4)



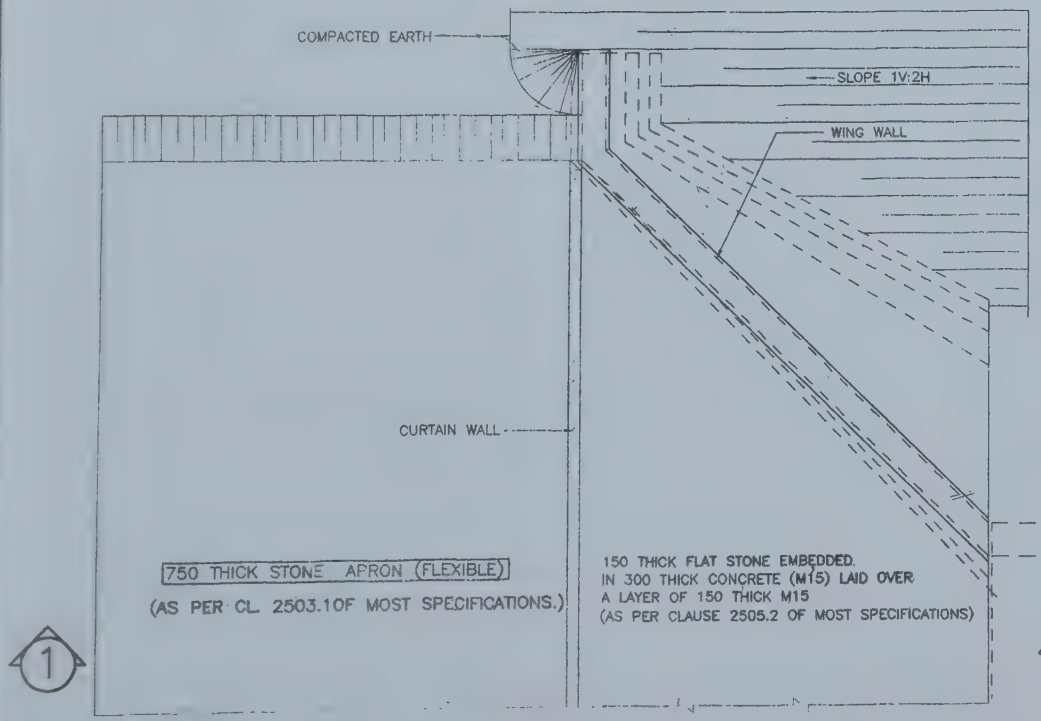
SECTION 1–1



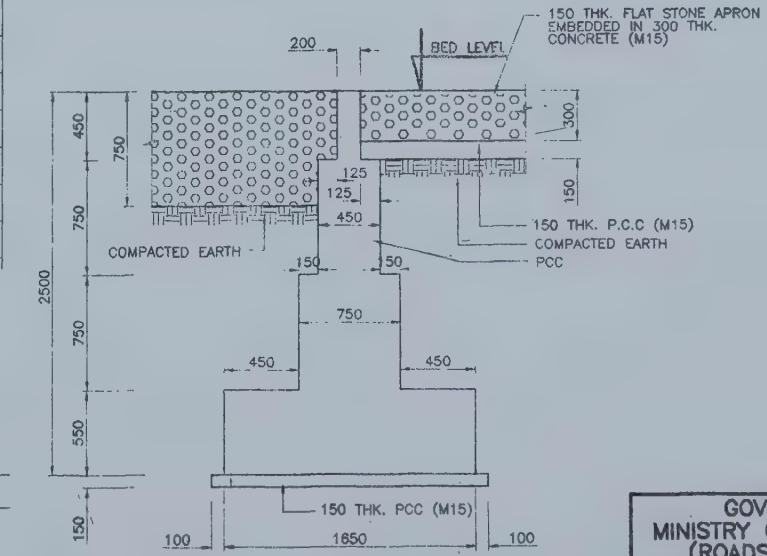
TYPICAL CROSS SECTION OF CURTAIN WALL TYPE–II
(UP STREAM SIDE)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED, ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. FOR GENERAL NOTES AND REFERENCE DRAWINGS REFER DRG.NO.SD/101
3. FOR DETAILS OF WING WALL, REFER DWG.NO.SD/113 (SHEET 1 TO 6 OF 6)
4. COMPACTED EARTH SHOULD CONFIRM TO CLAUSE. 305.2.1.5 OF MOST SPECIFICATIONS


COMPACTED EARTH
SLOPE 1V:2H
WING WALL
CURTAIN WALL
750 THICK STONE APRON (FLEXIBLE)
(AS PER CL. 2503.1OF MOST SPECIFICATIONS.)
150 THICK FLAT STONE EMBEDDED.
IN 300 THICK CONCRETE (M15) LAID OVER
A LAYER OF 150 THICK M15
(AS PER CLAUSE 2505.2 OF MOST SPECIFICATIONS)
1

PLAN



TYPICAL CROSS SECTION OF CURTAIN WALL TYPE–I
(DOWN STREAM SIDE)

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

TYPICAL DETAILS OF
FLOOR PROTECTION WORKS

GENERAL ARRANGEMENT

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(N.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/111 SHEET 1 OF 4

APRON:

BOX CELL DESIGNATION NN/ab/Ec	FLOOR APRON			FLEXIBLE APRON
	150 THK. PCC M15 (CUM)	300 THK. CONCRETE (CUM)	150 THK. FLAT STONE (CUM)	750 THK. STONE (CUM)
1/22/3	3.4	6.8	3.4	47.2
1/23/3	9.0	18.0	9.0	75.1
1/33/3	11.0	22.0	11.0	84.2
1/34/3	19.7	39.4	19.7	111.2
1/43/3	13.3	26.5	13.3	93.7
1/44/3	22.8	45.6	22.8	120.7
1/45/3	34.5	68.9	34.5	147.1
1/53/3	15.5	30.9	15.5	102.6
1/54/3	25.8	51.6	25.8	129.6
1/55/3	38.5	77.0	38.5	156.6
1/63/3	18.0	35.9	18.0	112.0
1/64/3	29.8	59.5	29.8	140.4
1/65/3	42.7	85.4	42.7	166.0
1/66/3	58.7	117.4	58.7	193.0
1/75/3	47.1	94.1	47.1	175.5
1/76/3	63.9	127.7	63.9	202.5
1/77/3	83.1	166.2	83.1	229.5
1/85/3	51.9	103.7	51.9	185.5
1/86/3	69.2	138.4	69.2	211.9
1/87/3	89.3	178.5	89.3	238.9
1/22/4	3.5	7.0	3.5	48.1
1/23/4	9.3	18.5	9.3	76.1
1/33/4	11.1	22.2	11.1	84.5
1/34/4	20.0	40.0	20.0	112.0
1/43/4	13.5	27.0	13.5	94.5
1/44/4	23.1	46.2	23.1	121.5
1/45/4	35.1	70.3	35.1	148.5
1/53/4	16.1	32.2	16.1	104.5
1/54/4	26.4	52.7	26.4	130.9
1/55/4	39.2	78.4	39.2	157.9

BOX CELL DESIGNATION NN/ab/Ec	FLOOR APRON			FLEXIBLE APRON
	150 THK. PCC M15	300 THK. CONCRETE	150 THK. FLAT STONE	750 THK. STONE
1/63/4	19.0	38.0	19.0	114.7
1/64/4	30.4	60.8	30.4	141.7
1/65/4	43.5	86.9	43.5	167.4
1/66/4	59.6	119.1	59.6	194.4
1/75/4	48.6	97.3	48.6	178.2
1/76/4	65.1	130.3	65.1	204.4
1/77/4	84.5	169.0	84.5	231.4
1/85/4	53.2	106.4	53.2	187.6
1/86/4	71.1	142.2	71.1	214.6
1/87/4	91.4	182.8	91.4	241.8
1/22/5	3.6	7.2	3.6	48.6
1/23/5	9.3	18.5	9.3	76.1
1/33/5	11.4	22.8	11.4	85.6
1/34/5	20.5	41.0	20.5	113.4
1/43/5	14.1	28.2	14.1	96.4
1/44/5	23.1	46.2	23.1	121.5
1/45/5	35.8	71.6	35.8	149.8
1/53/3	16.6	33.1	16.6	105.8
1/54/5	1.3	2.5	1.3	43.6
1/55/5	39.9	79.8	39.9	159.3
1/63/5	19.7	39.4	19.7	116.6
1/64/5	31.0	62.0	31.0	143.1
1/65/5	44.5	89.0	44.5	169.3
1/66/5	60.4	120.8	60.4	195.7
1/75/5	49.7	99.5	49.7	180.1
1/76/5	66.0	132.1	66.0	205.7
1/77/5	86.2	172.3	86.2	233.5
1/85/5	55.7	111.5	55.7	191.7
1/86/5	73.0	146.0	73.0	217.3
1/87/5	93.5	187.1	93.5	244.3

BOX CELL DESIGNATION NN/ab/Ec	FLOOR APRON			FLEXIBLE APRON
	150 THK. PCC M15	300 THK. CONCRETE	150 THK. FLAT STONE	750 THK. STONE
2/22/3	5.2	10.4	5.2	63.0
2/22/4	5.3	10.7	5.3	63.8
2/22/5	5.5	10.9	5.5	64.3
2/23/3	12.2	24.4	12.2	90.8
2/23/4	12.4	24.8	12.4	91.3
2/23/5	12.6	25.3	12.6	92.1
2/32/3	7.6	15.2	7.6	80.0
2/32/4	8.0	15.9	8.0	81.3
2/32/5	8.0	15.9	8.0	81.3
2/33/3	15.9	31.8	15.9	107.0
2/33/4	16.2	32.4	16.2	107.8
2/33/5	16.2	32.4	16.2	107.8
3/22/3	17.1	34.1	17.1	110.8
3/22/4	6.9	13.8	6.9	78.2
3/22/5	7.1	14.2	7.1	79.0
3/33/3	20.0	40.1	20.0	127.6
3/33/4	20.6	41.2	20.6	128.9
3/33/5	21.2	42.4	21.2	130.3

NOTES:

1. FOR ALL NOTES REFER. DRG. NO. SD/111 (SHEET 1 OF 4)
2. THIS DRAWING SHALL BE READ IN CONJUNCTION TO FOLLOWING DRAWINGS–
   –SD/113 (SHEET 1 TO 3 OF 6)
   –SD/103 (SHEET 1 & 2 OF 2) , SD/105 & SD/107
3. THE VARIOUS VARIABLES FOR DIFFERENT CASES OF BOX – CULVERTS ARE INTERPOLATED FROM TABLES GIVEN IN DRG. NO. SD/113 (SHEET 3 OF 6)
   THE GIVEN CONCRETE QUANTITY IS FOR ALL THE FOUR ARMS OF WING WALL.
4. FOR INTERMEDIATE HEIGHT/SECTIONS OF BOX CULVERTS, WING WALL DIMENSIONS SHALL BE INTERPOLATED FOR ACTUAL MAXIMUM HEIGHT OF WALL & CORRESPONDING SAFE BEARING CAPACITY USING DIMENSION SCHEDULE GIVEN IN DRG. NO. SD/113 (SHEET 3 OF 6)

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

ESTIMATION OF PROTECTION WORKS
(WITH EARTH CUSHION CASES)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/111 (SHEET 2 OF 4)

APRON:

BOX CELL DESIGNATION NN/ab/Ec	FLOOR APRON			FLEXIBLE APRON
	150 THK. PCC M15 (CUM)	300 THK. CONCRETE (CUM)	150 THK. FLAT STONE (CUM)	750 THK. STONE (CUM)
1/22/0	3.8	7.6	3.8	49.9
1/23/0	9.6	19.2	9.6	77.5
1/33/0	11.4	22.8	11.4	85.8
1/34/0	20.5	41.0	20.5	113.4
1/43/0	13.1	26.2	13.1	93.1
1/44/0	22.9	45.8	22.9	120.9
1/45/0	35.4	70.8	35.4	149.0
1/53/0	15.0	30.0	15.0	101.2
1/54/0	25.4	50.9	25.4	128.8
1/55/0	38.9	77.9	38.9	157.4
1/63/0	18.3	36.6	18.3	112.8
1/64/3	29.5	59.0	29.5	139.8
1/65/0	43.2	86.3	43.2	166.8
1/66/0	59.6	119.1	59.6	194.4
1/75/0	47.1	94.1	47.1	175.5
1/76/0	64.4	128.8	64.4	203.3
1/77/0	87.2	174.4	87.2	234.9
1/85/0	50.7	101.4	50.7	183.6
1/86/0	68.6	137.3	68.6	211.1
1/87/0	89.3	178.5	89.3	238.9
2/22/0	6.0	11.9	6.0	66.8
2/23/0	13.1	26.2	13.1	93.8
2/32/0	8.0	16.0	8.0	81.7
2/33/0	16.7	33.5	16.7	109.5
3/22/0	7.7	15.4	7.7	81.5
3/33/0	21.6	43.2	21.6	132.3

CURTAIN WALL:

BOX CELL DESIGNATION NN/ab/Ec	CONCRETE FOR D/S CURTAIN WALL (CUM)	CONCRETE FOR U/S CURTAIN WALL (CUM)	TOTAL CONCRETE FOR CURTAIN WALLS (CUM)	PCC M15 UNDER THE CURTAIN WALLS (CUM)
1/22/0	14.0	10.9	24.9	3.7
1/23/0	21.8	16.8	38.6	5.8
1/33/0	24.1	18.6	42.7	6.4
1/34/0	31.9	24.7	56.5	8.4
1/43/0	26.2	20.3	46.4	6.9
1/44/0	34.0	26.3	60.3	9.0
1/45/0	41.9	32.4	74.3	11.1
1/53/0	28.5	22.0	50.5	7.5
1/54/0	36.2	28.0	64.2	9.6
1/55/0	44.2	34.2	78.5	11.7
1/63/0	31.7	24.5	56.3	8.4
1/64/3	39.3	30.4	69.7	10.4
1/65/0	46.9	36.3	83.2	12.4
1/66/0	54.6	42.3	96.9	14.5
1/75/0	49.3	38.2	87.5	13.1
1/76/0	57.1	44.2	101.3	15.1
1/77/0	66.0	51.1	117.1	17.5
1/85/0	51.6	39.9	91.5	13.7
1/86/0	59.3	45.9	105.2	15.7
1/87/0	67.2	51.9	119.1	17.8
2/22/0	18.8	14.5	33.3	5.0
2/23/0	26.4	20.4	46.8	7.0
2/32/0	23.0	17.8	40.7	6.1
2/33/0	30.8	23.8	54.6	8.2
3/22/0	22.9	17.7	40.6	6.1
3/33/0	37.2	28.8	66.0	9.8

NOTES:

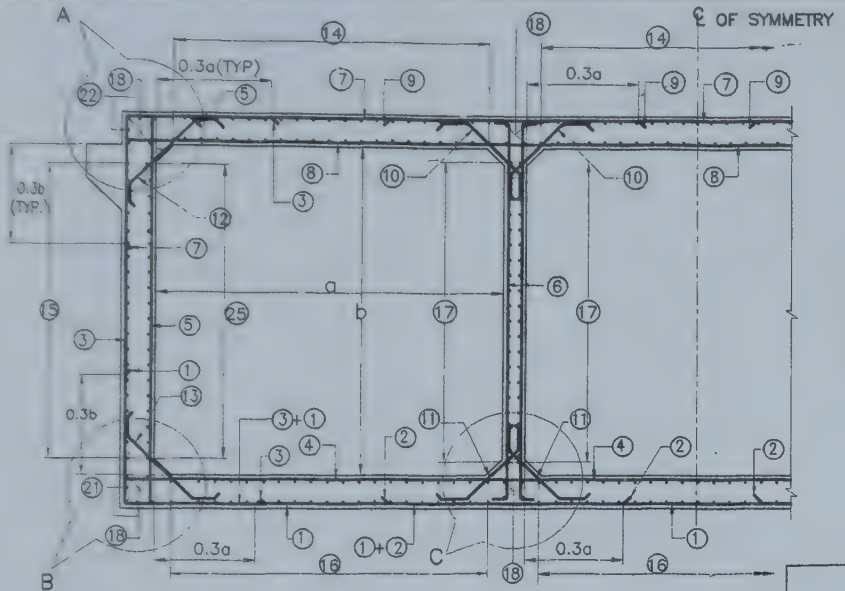
1. FOR ALL NOTES REFER DWG. NO. SD/111 (SHEET 2 OF 4)

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

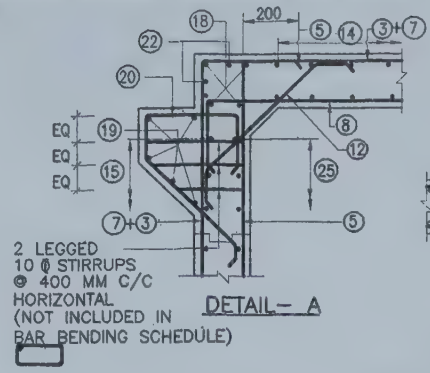
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

ESTIMATION OF PROTECTION WORKS
(WITHOUT EARTH CUSHION CASES)

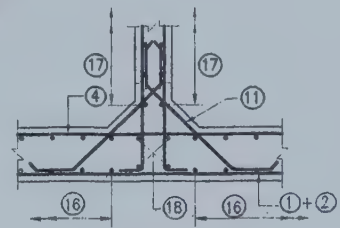
DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/111 (SHEET 4 OF 4)



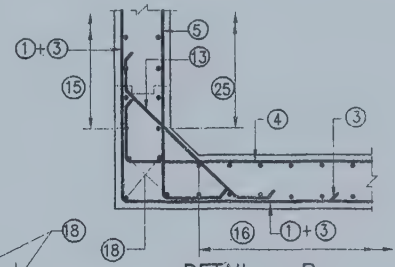
REINFORCEMENT DETAILS OF THREE CELL BOX CULVERT



DETAIL– A



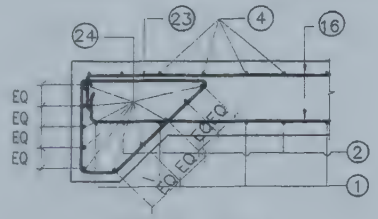
DETAIL C



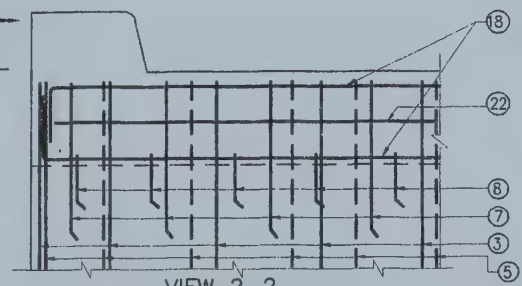
DETAIL – B

NOTES:

1. FOR GENERAL NOTES REFER DRG. NO. SD/101
2. FOR GENERAL ARRANGEMENT REFER DRG. NO. SD/106.
3. FOR BAR BENDING SCHEDULE REFER DRAWING NO. SD/112 (SHEET 2 OF 2).
4. FOR LAP ZONES REFER DRAWING NO. SD/117 (SHEET 2 OF 2).



SECTION 1–1

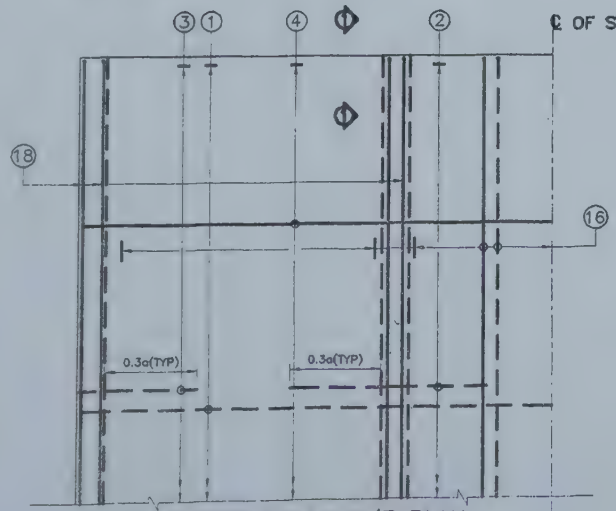


VIEW 2–2
(HAUNCH LINES NOT SHOWN)

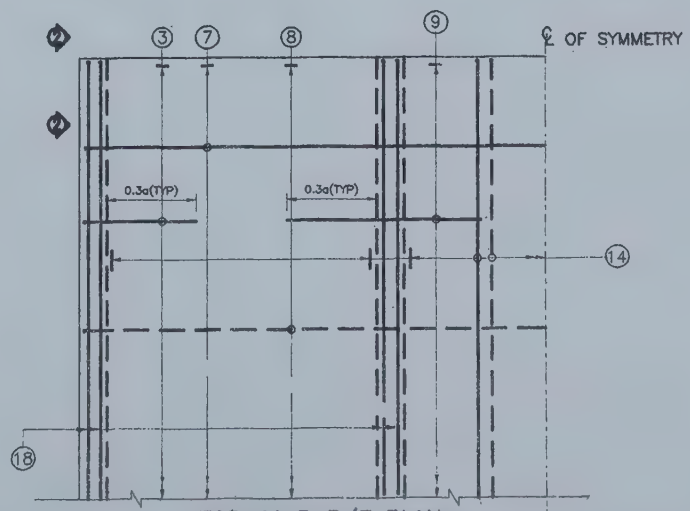
LEGEND :

——— : TOP FACE BARS/ OUTER FACE BARS

– – – – : BOTTOM FACE BARS/ INNER FACE BARS



BOTTOM SLAB R/F PLAN
(HAUNCH LINES & BAR MARK (5) (21) NOT SHOWN IN PLAN)



TOP SLAB R/F PLAN
(KERB, HAUNCH LINES & BAR MARK (5) (22) NOT SHOWN IN PLAN)

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

TRIPLE CELL R.C.C BOX CULVERTS
(WITHOUT EARTH CUSHION)
TYPICAL REINFORCEMENT DETAILS

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/112 (SHEET 1 OF 2)

DRG.NO. SD/112 (SHEET 2 OF 2)

SCHEDULE OF REINFORCEMENT

BAR MARK	SHAPE OF BARS (NOT TO SCALE)	BOX – CELL DESIGNATION Nc/ab/Ec	3/22/0								3/33/0							
			BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1		16	250	920	7240	9025	49	442.2	698.0	16	200	1350	10640	13285	61	810.4	1279.1
②	M1		12	250	1500	–	1500	96	144.0	127.8	12	200	2200	–	2200	120	264.0	234.4
③	M2 M1 M1		16	250	920	2640	4425	98	433.7	684.5	16	200	1320	3850	6435	122	785.1	1239.1
④	M1 M2 M1		16	250	200	7240	7585	49	371.7	586.6	20	200	200	10640	10971	61	669.3	1650.5
⑤	M2 M1 M1		16	250	260	2640	3105	98	304.3	480.3	16	200	260	3850	4315	122	526.4	830.9
⑥	M2 M1 M1		20	250	320	2640	3211	196	629.4	1552.2	20	200	320	3850	4421	244	1078.8	2660.5
⑦	M2 M1 M1		16	250	920	7240	9025	49	442.2	698.0	16	200	1300	10640	13185	61	804.3	1269.4
⑧	M2 M1 M1		20	250	320	7240	7811	49	382.8	943.9	20	200	320	10640	11211	61	683.8	1686.6
⑨	M1		16	250	1500	–	1500	98	147.0	232.0	16	200	2200	–	2200	122	268.4	423.6
⑩	M2 M1 M1		10	250	200	918	1318	196	258.4	159.3	10	200	200	1173	1573	244	383.8	236.6
⑪	M1 M2 M1		10	250	200	918	1318	196	258.4	159.3	10	200	200	1244	1643	244	401.0	247.2
⑫	M2 M1 M1		10	250	200	1017	1417	98	138.9	85.6	10	200	200	1272	1672	122	204.0	125.7
⑬	M1 M2 M1		10	250	200	1017	1417	98	138.9	85.6	10	200	200	1343	1742	122	212.6	131.1
⑭	M2 M1 M1		10	250	235	11900	12336	48	592.1	365.1	10	200	275	11900	12416	90	1117.4	688.9
⑮	M2 M1 M1		12	250	192	11900	12243	16	195.9	173.9	12	200	235	11900	12329	30	369.9	328.4
⑯	M2 M1 M1		12	250	192	11900	12243	48	587.7	521.7	12	200	250	11900	12359	90	1112.3	987.5
⑰	M2 M1 M1		12	250	192	11900	12243	32	391.8	347.8	10	200	200	11900	12286	60	735.9	453.7
⑱	M2 M1 M1		12	–	200	11900	12259	32	392.3	348.3	12	–	200	11900	12259	32	392.3	348.3
⑲	M1		12	–	11900	–	11900	10	119.0	105.7	12	–	11900	–	11900	10	119.0	105.7
⑳	M1 M2		12	250	1006	1268	2274	98	222.8	197.8	12	200	1006	1306	2312	122	282.0	250.4
㉑	M1 M2 M1		10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	12186	4	48.7	30.1
㉒	M1 M2 M1		10	–	160	11900	12186	4	48.7	30.1	10	–	160	11900	12186	4	48.7	30.1
㉓	M1+0.2m M1 135° M2 0.2m.		12	150	1100	1556	4217	100	421.7	374.4	12	200	1100	1556	4217	110	463.9	411.9
㉔	M2 M1 M1		12	–	192	7240	7583	20	151.7	134.6	12	–	192	10640	10983	20	219.7	195.0
㉕	M2 M1 M1		10	250	185	11900	12236	16	195.8	120.7	10	250	235	11900	12336	24	296.1	182.5
TOTAL STEEL (Kgs)									9243								16027	
TOTAL CONCRETE (cum)									116								207	

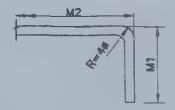
NOTES:

1. JOINT OR LAPPING OF BARS SHALL BE SUITABLY STAGGERED AS PER CLAUSE 304.6 OF IRC:21–1987.
2. FULL SCALE ELEVATION FOR THE BARS SHALL BE LINED OUT ON A PLAIN PLASTERED FLOOR TO THE DIMENSIONS SHOWN ON THE DRAWING SO AS TO GET CORRECT CLEARANCE BETWEEN DIFFERENT BARS AND THEN THE BARS SHALL BE BENT TO PROPER SHAPE.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING No. SD/112 (SHEET 1 OF 2).
4. QUANTITY OF CONCRETE DOES NOT INCLUDE GUARD STONES.
5. QUANTITY OF STEEL DOES NOT INCLUDE 5% EXTRA FOR WASTAGE AND LAPS.
6. BAR No.20 IS DETAILED AS BELOW:

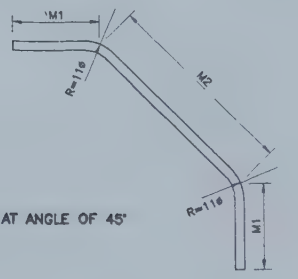
BENDING OF BARS

BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

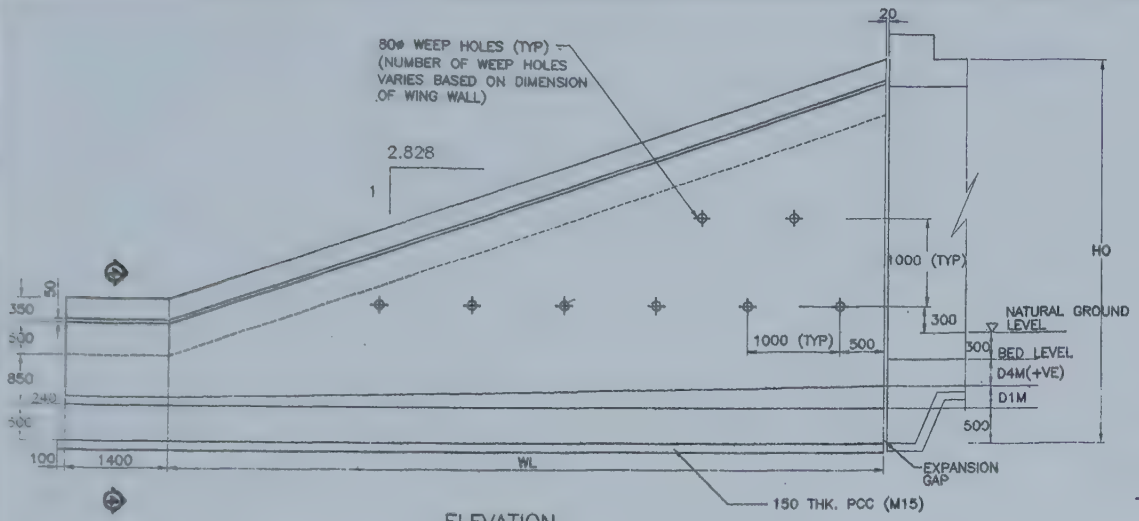
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

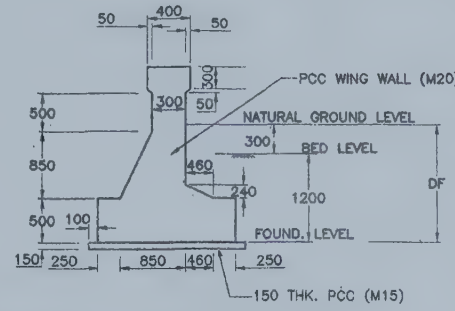
TRIPLE CELL R.C.C BOX CULVERTS
2m x 2m TO 3m x3m
(WITHOUT EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/112 (SHEET 2 OF 2)



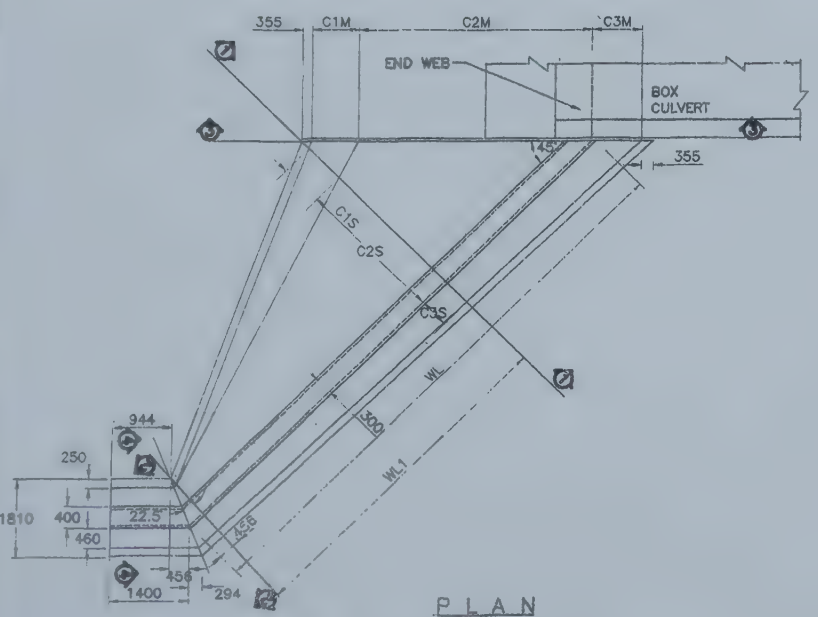
ELEVATION



SECTION 4 – 4 (MIN HEIGHT)

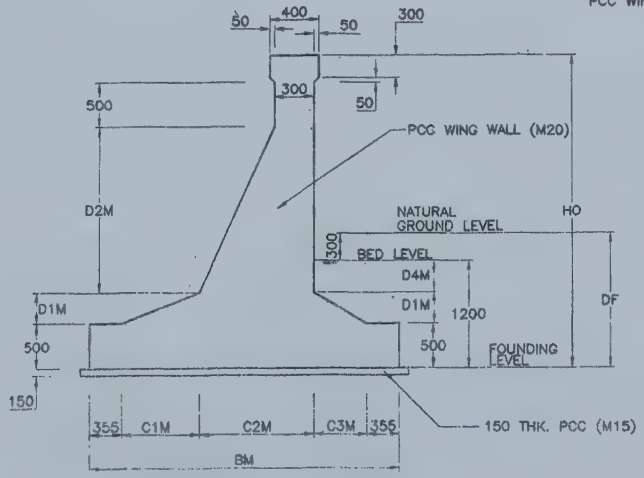
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED. DIMENSIONS ARE NOT TO BE SCALED.
2. FOR GENERAL NOTES REFER DRG. NO. SD/101.
3. FOR DIMENSION SCHEDULE REFER DRG. NO. SD/113 (SHEET 3 TO 6 OF 6)
4. SOFT AND LOOSE PATCHES IN THE BEARING AREA ARE TO BE REPLACED BY COMPACTED GRANNULAR FILLS WITH LAYERS NOT EXCEEDING 300mm.
5. IF THERE IS ANY LEVEL DIFFERENCE IN FOUNDING LEVEL OF WING WALL AND DOWNWARD PROJECTION AT THE ADJACENT EDGE OF BOX STRUCTURE, PROPER GRANULAR PROTECTION IS TO BE PROVIDED IN THIS AREA TO COMPENSATE THE LEVEL DIFFERENCE.
6. MARKED SECTION 2–2 NOT SHOWN IN DRG & IS GIVEN ONLY TO MENTION LENGTH WL1.
7. THE FILTER MEDIA SHALL BE PROVIDED BEHIND THE SURFACE OF WING WALL AS PER IRC:78.

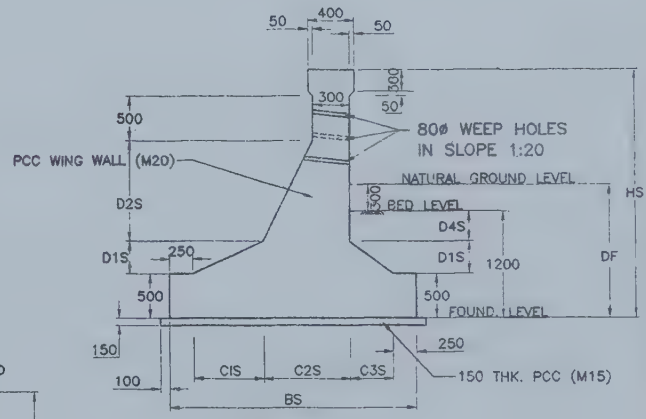


PLAN

(BLINDING LAYER LINE AND WEEP HOLES NOT SHOWN IN PLAN)



SECTION 3–3



SECTION 1–1

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

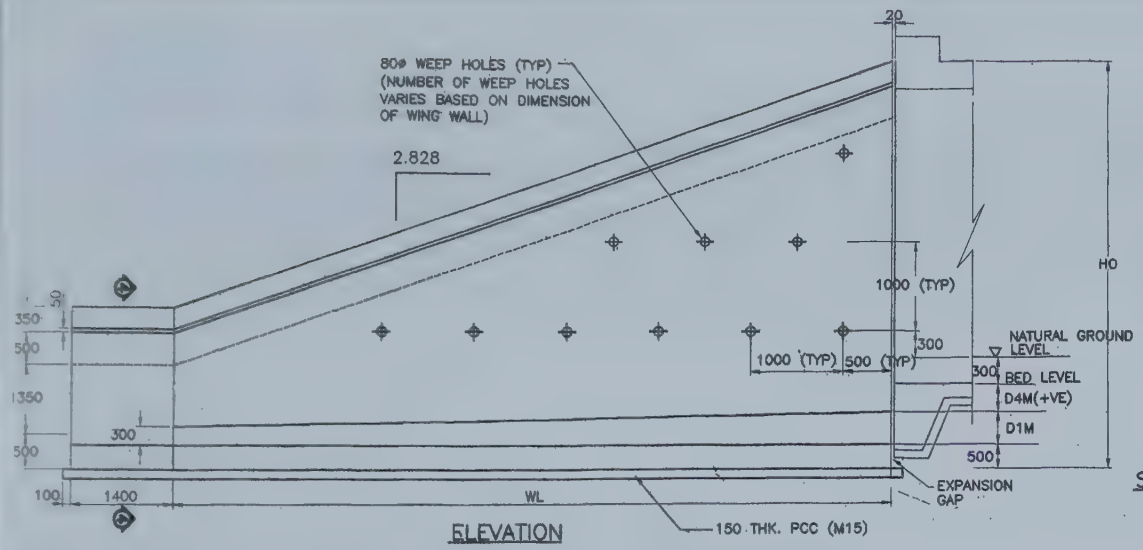
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DETAILS OF PCC WING WALL

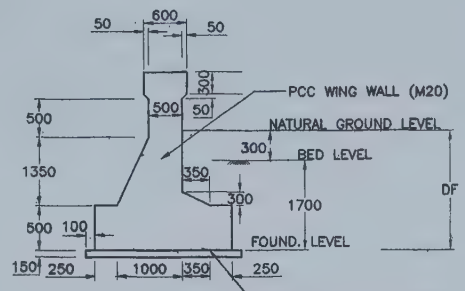
GENERAL ARRANGEMENT
(MAX HEIGHT OF WING WALL BELOW 6m.)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) ICPL	(C.C.BHATTACHARYA) CE (R) S&R MOST	DRG. NO. SD/113 (SHEET 1 OF 6)

DRG.NO. SD/113 (SHEET 2 OF 6)



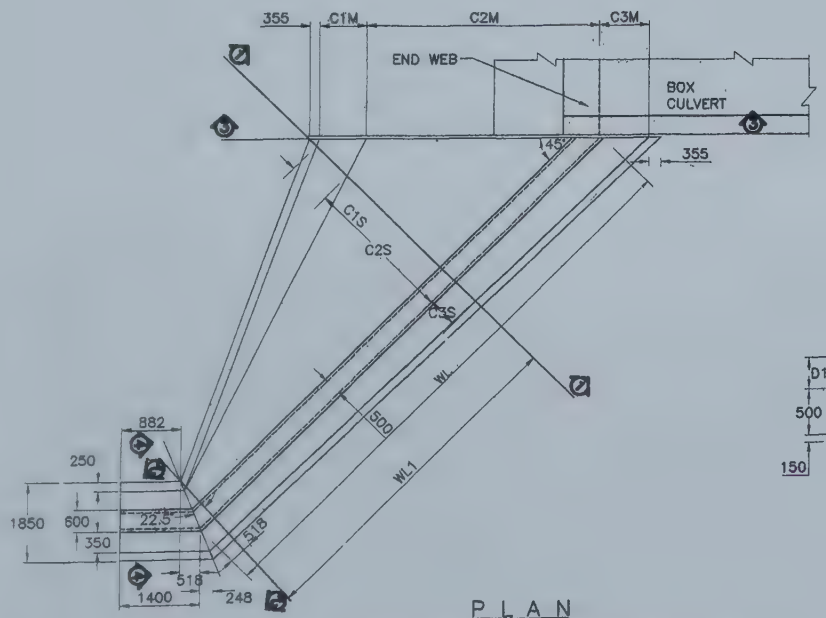
ELEVATION



SECTION 4 – 4 (MIN HEIGHT)

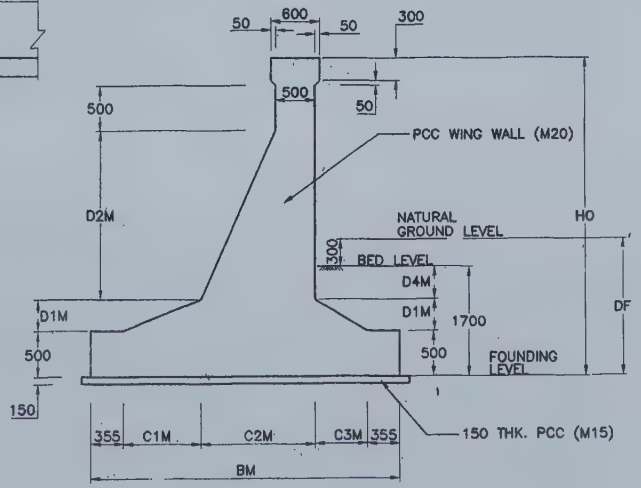
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED. DIMENSIONS ARE NOT TO BE SCALED.
2. FOR GENERAL NOTES REFER DRG. NO. SD/101.
3. FOR DIMENSIONS SCHEDULE REFER DRG. NO. SD/113 (SH 3 TO 6 OF 6)
4. SOFT AND LOOSE PATCHES IN THE BEARING AREA ARE TO BE REPLACED BY COMPACTED GRANULAR FILLS WITH LAYERS NOT EXCEEDING 300mm.
5. IF THERE IS ANY LEVEL DIFFERENCE IN FOUNDING LEVEL OF WING WALL AND DOWNWARD PROJECTION AT THE ADJACENT EDGE OF BOX STRUCTURE, PROPER GRANULAR PROTECTION IS TO BE PROVIDED IN THIS AREA TO COMPENSATE THE LEVEL DIFFERENCE.
6. MARKED SECTION 2–2 NOT SHOWN IN DRG & IS GIVEN ONLY TO MENTION LENTGH WL1.
7. IF OVERALL HEIGHT IS ABOVE 6M, IT IS BETTER TO BE OPT FOR R.C.C TYPE WING WALL RATHER THAN P.C.C. WING WALL. FOR THIS SPECIFIC CASE INDEPENDENT DESIGN HAS TO BE DONE AS PER SITE CONDITION AND DIRECTION OF THE ENGINEER-IN-CHARGE.
8. THE FILTER MEDIA SHALL BE PROVIDED BEHIND THE SURFACE OF WING WALL AS PER IRC:78.

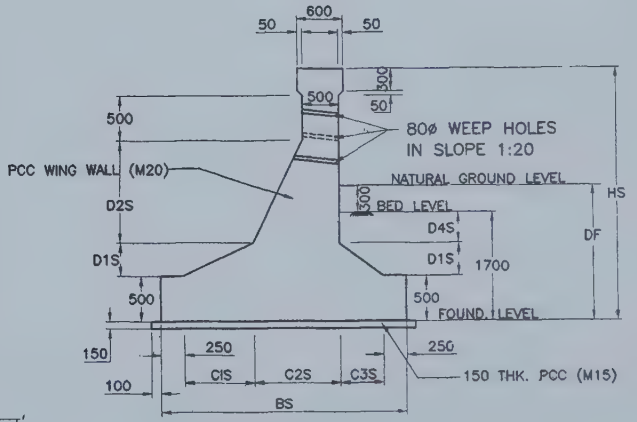


PLAN

(BLINDING LAYER LINE AND WEEP HOLES NOT SHOWN IN PLAN)



SECTION 3–3



SECTION 1–1

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DETAILS OF PCC WING WALL

GENERAL ARRANGEMENT (MAX HEIGHT OF WING WALL BELOW 6m.)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/113 (SHEET 2 OF 6)

TABLE No. – 1

SALIENT DIMENSIONS OF PCC WING WALL
CONSIDERING NET SBC= 5t/m2

PCC (M20)

S.NO.	MAX.HT. HO (mm)	DEPTH OF FOUND. DF(mm)	LENGTH BETWEEN SEC. 1–1 AND SEC. 2–2 (mm)	SECTION 1–1								SECTION 3–3						
				HT.AT SEC 1–1 HS (mm)	C1S (mm)	C2S (mm)	C3S (mm)	BS (mm)	D1S (mm)	D2S (mm)	D4S (mm)	C1M (mm)	C2M (mm)	C3M (mm)	BM (mm)	D1M (mm)	D2M (mm)	D4M (mm)
1.	3000	1500	707	2611	0	850	600	1950	320	941	380	0	1202	1157	2859	444	1206	256
2.	4000	1500	185	2427	3350	850	650	5350	264	813	436	4738	1202	7366	13806	840	1810	-140

TABLE No. – 2

SALIENT DIMENSIONS OF PCC WING WALL
CONSIDERING NET SBC= 10t/m2

PCC (M20)

S.NO.	MAX.HT. HO (mm)	DEPTH OF FOUND. DF(mm)	LENGTH BETWEEN SEC. 1–1 AND SEC. 2–2 (mm)	SECTION 1–1								SECTION 3–3						
				HT.AT SEC 1–1 HS (mm)	C1S (mm)	C2S (mm)	C3S (mm)	BS (mm)	D1S (mm)	D2S (mm)	D4S (mm)	C1M (mm)	C2M (mm)	C3M (mm)	BM (mm)	D1M (mm)	D2M (mm)	D4M (mm)
1.	3000	1500	707	2611	0	850	460	1810	280	981	420	0	1202	651	2353	342	1308	358
2.	4000	1500	2935	3399	500	950	600	2550	600	1449	100	707	1344	963	3514	808	1842	-108
3.	5000	1500	4064	3798	1900	1250	550	4200	570	1878	130	2687	1768	884	5839	846	2804	-146
4.	6000	1500	4242	3861	4100	1700	470	6770	480	2031	220	5798	2404	685	9387	822	3828	-122
5.	6000	2000	4316	4409	2700	1550	670	5420	750	2309	450	3818	2192	1419	8139	1219	3431	-19
6.	7000	2000	4684	4532	4700	2030	630	7860	700	2482	500	6647	2871	1484	11712	1299	4351	-99

TABLE No. – 3

SALIENT DIMENSIONS OF RCC WING WALL
CONSIDERING NET SBC= 15t/m2

PCC (M20)

S.NO.	MAX.HT. HO (mm)	DEPTH OF FOUND. DF(mm)	LENGTH BETWEEN SEC. 1–1 AND SEC. 2–2 (mm)	SECTION 1–1								SECTION 3–3						
				HT.AT SEC 1–1 HS (mm)	C1S (mm)	C2S (mm)	C3S (mm)	BS (mm)	D1S (mm)	D2S (mm)	D4S (mm)	C1M (mm)	C2M (mm)	C3M (mm)	BM (mm)	D1M (mm)	D2M (mm)	D4M (mm)
1.	3000	1500	707	2611	0	850	460	1810	280	981	420	0	1202	651	2353	342	1308	358
2.	4000	1500	2785	3346	600	1000	500	2600	500	1496	200	849	1414	745	3508	673	1977	27
3.	5000	1500	4814	4063	1100	1300	460	3360	620	2093	80	1656	1838	651	4545	829	2821	-129
4.	6000	1500	4442	3932	3800	1800	460	6560	500	2082	200	5374	2548	651	9071	842	3808	-142
5.	6000	2000	5566	4851	1450	1550	600	4100	910	2591	290	2051	2192	1055	6008	1266	3384	-66
6.	7000	2000	6244	5091	2800	2350	510	6160	750	2991	450	3960	3323	917	8910	1139	4511	61
7.	8000	2000	6633	5228	4700	2890	480	8570	700	3178	500	6647	4087	896	12340	1173	5477	27
8.	9000	2000	6351	5129	7300	3400	410	11610	580	3199	620	10324	4808	726	16568	1063	6587	137
9.	10000	2000	6000	5004	9800	4080	300	14680	420	3234	780	13859	5770	258	20597	703	7947	497

NOTES:

1. FOR GENERAL NOTES REFER. DRG. NO. SD/101
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRG. No. SD/113 (SHEET 1 & 2 OF 6)
3. WING WALL IS DESIGNED FOR SEVERE CONDITION OF EXPOSURE AND SAME STRUCTURE CAN BE USED FOR MODERATE CONDITION OF EXPOSURE.
4. MIN. VALUE OF D4M ALLOWABLE : –150mm.
   IF D4M IS (–VE) , IT SHOULD BE MEASURED ABOVE BED LEVEL & FOR (+VE) VALUES, IT SHOULD BE TAKEN BELOW BED LEVEL.

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DIMENSION SCHEDULE FOR PCC WING WALL (GENERAL)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CONSULTING ENGINEERING SERVICES @ LTD.	(M.C.TANDON) TANDON CONSULTANTS (PVT) LTD.	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/113 (SHEET 3 OF 6)

TABLE No. – 4

SALIENT DIMENSIONS OF PCC WING WALL

PCC (M20)

SL NO	BOX DESIGNATION Ne\ab\Ec	NET SAFE BEARING CAPACITY T/Sqm	MAX.HT. HO (mm)	DEPTH OF FOUND. DF(mm)	LENGTH OF W.WALL WL(mm)	LENGTH BETWEEN SEC. 1–1 AND SEC. 2–2 (mm)	SECTION 1–1								SECTION 3–3							TOTAL VOLUME OF CONCRETE IN WING WALL (cum.)
							HT.AT SEC 1–1 HS (mm)	C1S (mm)	C2S (mm)	C3S (mm)	BS (mm)	D1S (mm)	D2S (mm)	D4S (mm)	C1M (mm)	C2M (mm)	C3M (mm)	BM (mm)	D1M (mm)	D2M (mm)	D4M (mm)	
1	1/22/3	10	3450	1500	3535	1710	2966	225	895	523	2143	424	1192	276	318	1266	791	3085	552	1548	148	44.03
2	1/23/3	10	4480	1500	6448	3477	3591	1172	1094	576	3342	586	1655	114	1657	1548	925	4840	826	2304	–126	94.88
	1/33/3	10	4570	1500	6702	3579	3626	1298	1121	572	3491	583	1694	117	1836	1586	918	5049	830	2390	–130	100.43
	1/34/3	10	5570	1500	9530	4165	3834	3154	1507	504	5665	519	1965	181	4460	2131	771	8071	832	3388	–132	178.97
	1/43/3	10	4670	1500	6985	3691	3666	1438	1161	567	3656	580	1736	120	2034	1628	910	5282	833	2487	–133	106.83
	1/44/3	15	5670	1500	9813	4565	3975	2909	1635	460	5504	540	2086	160	4114	2312	651	7787	838	3482	–138	190.91
	1/45/3	15	7150	2000	12585	6302	5112	3085	2431	506	6522	743	3019	458	4363	3438	914	9425	1144	4656	56	421.07
	1/53/3	10	4750	1500	7211	3782	3698	1550	1175	563	3788	578	1771	123	2192	1662	904	5468	837	2564	–137	112.11
	1/54/3	10	5750	1500	10039	4198	3845	3550	1588	490	6128	503	1993	198	5020	2245	735	8710	828	3572	–128	196.42
	1/55/3	15	7250	2000	12867	6341	5125	3275	2485	503	6763	738	3038	463	4632	3514	912	9768	1148	4753	53	440.90
	1/63/3	10	4850	1500	7494	3895	3738	1690	1205	558	3953	575	1814	126	2390	1704	896	5700	840	2660	–140	118.94
	1/64/3	10	5900	1500	10464	4224	3855	3880	1655	478	6513	489	2016	211	5487	2340	705	9242	824	3726	–124	211.69
	1/65/3	15	7350	2000	13150	6380	5139	3465	2539	500	7004	733	3056	468	4900	3590	910	10111	1151	4849	49	461.28
	1/66/3	15	8350	2000	15978	6534	5193	5610	3069	456	9634	658	3185	542	7934	4339	837	13820	1135	5866	66	693.21
	1/75/3	15	7450	2000	13433	6419	5153	3655	2593	497	7245	728	3075	473	5169	3867	908	10454	1154	4946	46	482.21
	1/76/3	15	8450	2000	16261	6506	5183	5870	3120	449	9938	646	3187	554	8302	4411	820	14243	1124	5977	76	718.79
	1/77/3	15	9450	2000	19089	6193	5073	8425	3706	361	12992	508	3215	692	11915	5241	515	18381	901	7199	299	1012.62
	1/85/3	15	7570	2000	13772	6486	5169	3883	2658	493	7534	722	3098	479	5492	3758	905	10865	1158	5062	42	508.09
	1/86/3	15	8550	2000	16544	6478	5174	6130	3171	442	10242	634	3190	566	8669	4484	803	14665	1113	6088	88	744.90
	1/87/3	15	9550	2000	19372	6158	5060	8675	3774	350	13299	492	3218	708	12268	5337	469	18784	865	7335	335	1046.53
	1/22/4	10	3480	1500	3620	1776	2989	240	898	527	2165	434	1206	266	339	1270	801	3120	566	1564	134	45.19
	1/23/4	10	4520	1500	6561	3522	3606	1228	1106	574	3408	584	1672	116	1737	1564	922	4933	828	2342	–128	97.33
	1/33/4	10	4580	1500	6731	3590	3630	1312	1124	571	3507	583	1698	117	1855	1590	917	5073	830	2400	–130	101.06
	1/34/4	15	5600	1500	9615	4591	3984	2720	1600	460	5280	548	2086	152	3847	2263	651	7471	837	3413	–137	183.46
	1/43/4	10	4700	1500	7070	3725	3678	1480	1160	565	3705	579	1749	121	2093	1641	908	5352	835	2515	–135	108.79
	1/44/4	15	5700	1500	9898	4554	3971	2990	1650	460	5600	536	2085	164	4229	2334	651	7923	838	3512	–138	194.15
	1/45/4	15	7200	2000	12726	6322	5118	3180	2458	504	6642	740	3028	460	4497	3476	913	9596	1146	4704	54	430.92
	1/53/4	10	4820	1500	7409	3861	3726	1648	1196	559	3903	575	1801	125	2331	1692	898	5631	839	2631	–139	116.87
	1/54/4	15	5800	1500	10181	4516	3958	3260	1700	480	5920	524	2084	176	4610	2404	651	8376	839	3611	–139	205.13
	1/55/4	15	7300	2000	13009	6361	5132	3370	2512	501	6883	735	3047	465	4766	3552	911	9939	1149	4801	51	451.02
	1/63/4	10	4950	1500	7777	4008	3778	1830	1235	553	4118	572	1857	129	2588	1747	888	5933	844	2756	–144	126.01
	1/64/4	15	5930	1500	10605	4461	3939	3665	1775	460	6400	506	2083	194	5183	2511	851	9055	841	3759	–141	222.19
	1/65/4	15	7400	2000	13292	6400	5146	3560	2566	498	7124	730	3066	470	5035	3629	909	10282	1153	4897	47	471.88
	1/66/4	15	8400	2000	16120	6520	5188	5740	3094	452	9786	652	3186	548	8118	4375	828	14031	1129	5921	71	705.94
	1/75/4	15	7550	2000	13716	6458	5166	3845	2647	494	7486	723	3094	478	5438	3743	905	10797	1158	5042	42	503.72
	1/76/4	15	8520	2000	16459	6486	5177	6052	3155	444	10151	638	3189	562	8559	4462	808	14539	1116	6054	84	737.01
	1/77/4	15	9520	2000	19287	6168	5064	8600	3754	353	13206	497	3217	703	12162	5308	483	18663	876	7294	324	1036.27
	1/85/4	15	7650	2000	13999	6497	5180	4035	2701	491	7727	718	3113	483	5707	3820	903	11140	1161	5139	39	525.79
	1/86/4	15	8650	2000	16827	6450	5164	6390	3222	435	10546	622	3192	578	9037	4556	786	15088	1102	6199	99	771.55

NOTES:

FOR ALL NOTES REFER. DRG. NO. SD/113 (SHEET 3 OF 6)

2. THIS DRAWING SHALL BE READ IN CONJUNCTION TO FOLLOWING DRAWINGS–
   –SD/113 (SHEET 1 TO 3 OF 5)
   –SD/103 (SHEET 1 & 2 OF 2) , SD/105 & SD/107
   –SD/102 , SD/104 & SD/106
3. THE VARIOUS VARIABLES FOR DIFFERENT CASES OF BOX – CULVERTS ARE INTER POLATED FROM TABLES GIVEN IN DRG. NO. SD/113 (SHEET 3 OF 6)

   THE GIVEN CONCRETE QUANTITY IS FOR ALL THE FOUR ARMS OF WING WALL.
4. FOR INTERMEDIATE HEIGHT/SECTIONS OF BOX CULVERTS, WING WALL DIMENSIONS SHALL BE INTERPOLATED FOR ACTUAL MAXIMUM HEIGHT OF WALL & CORRESPONDING SAFE BEARING CAPACITY USING DIMENSION SCHEDULE GIVEN IN DRG. NO. SD/113 (SHEET 3 OF 6)

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DIMENSION SCHEDULE FOR PCC WING WALL

(WITH EARTH CUSHION CASES)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/113 (SHEET 4 OF 6)

TABLE No. – 4 (CONT...)

SALIENT DIMENSIONS OF PCC WING WALL
PCC (M20)

SL. NO.	BOX DESIGNATION NO\SP\SD	NET SAFE BEARING CAPACITY T/Sqm	MAX.HT. HO (mm)	DEPTH OF FOUND. DF(mm)	LENGTH OF W.WALL WL(mm)	LENGTH BETWEEN SEC. 1–1 AND SEC. 2–2(mm)	SECTION 1–1								SECTION 3–3							TOTAL VOLUME OF CONCRETE IN WING WALL (cum.)
							HT.AT SEC 1–1 HS (mm)	C1S (mm)	C2S (mm)	C3S (mm)	BS (mm)	D1S (mm)	D2S (mm)	D4S (mm)	C1M (mm)	C2M (mm)	C3M (mm)	BM (mm)	D1M (mm)	D2M (mm)	D4M (mm)	
50	1/87/4	15	9650	2000	19655	6123	5048	8925	3842	339	13606	476	3222	724	12622	5433	422	19187	829	7471	371	1081.20
51	1/22/5	10	3500	1500	3676	1821	3005	250	900	530	2180	440	1215	260	354	1273	807	3144	575	1575	125	45.98
52	1/23/5	15	4520	1500	6581	3840	3719	860	1156	479	2995	562	1806	138	1217	1634	696	4257	754	2416	–54	93.78
53	1/33/5	10	4620	1500	6844	3635	3648	1368	1136	569	3573	581	1715	119	1935	1607	914	6168	832	2438	–132	103.60
54	1/34/5	15	5650	1500	9757	4572	3978	2855	1625	460	5440	542	2086	158	4038	2298	651	7697	837	3483	–139	188.77
55	1/43/5	10	4770	1500	7268	3804	3706	1578	1181	562	3821	577	1779	123	2232	1670	902	5514	837	2563	–137	113.46
56	1/44/5	15	5700	1500	9898	4554	3971	2990	1650	460	5600	536	2085	164	4229	2334	691	7923	838	3512	–138	194.15
57	1/45/5	15	7250	2000	12867	6341	5125	3275	2485	503	6763	738	3038	463	4632	3514	912	9768	1148	4753	–3	440.90
58	1/53/5	15	4870	1500	7551	4550	3970	1035	1261	465	3261	604	2015	96	1464	1783	663	4620	809	2711	–109	115.96
59	1/54/5	15	5850	1500	10322	4498	3952	3395	1725	460	6080	518	2084	182	4801	2440	651	8602	840	3660	–140	210.74
60	1/55/5	15	7350	2000	13150	6380	5139	3465	2539	500	7004	733	3056	468	4900	3590	910	10111	1151	4849	49	461.26
61	1/63/5	15	5020	1500	7975	4807	4060	1154	1310	460	3424	618	2093	82	1632	1852	651	4846	829	2841	–129	126.81
62	1/64/5	15	6500	2000	10746	5905	4971	2125	1950	555	5130	830	2791	370	3006	2758	986	7459	1203	3948	–3	301.60
63	1/65/5	15	7470	2000	13490	6427	5155	3693	2604	496	7293	727	3079	474	5223	3682	907	10522	1155	4965	45	468.47
64	1/66/5	15	8450	2000	16261	6506	5183	5870	3120	449	9938	646	3187	554	8302	4411	820	14243	1124	5977	76	718.79
65	1/75/5	15	7620	2000	13914	6485	5176	3978	2685	491	7654	719	3107	481	5626	3797	904	11037	1160	5110	40	519.11
66	1/76/5	15	8570	2000	16600	6472	5172	6182	3181	440	10303	632	3190	568	8743	4498	799	14750	1110	6110	90	750.19
67	1/77/5	15	9600	2000	19513	6140	5054	8800	3808	344	13452	484	3220	718	12445	5385	445	18985	847	7403	353	1063.77
68	1/85/5	15	7800	2000	14423	6555	5201	4320	2782	488	8088	710	3141	490	6110	3934	900	11654	1186	5284	34	560.01
69	1/86/5	15	8750	2000	17109	6422	5154	6650	3273	428	10860	610	3194	580	9405	4628	769	15511	1091	6310	110	798.74
70	1/87/5	15	9750	2000	19937	6088	5035	9175	3910	328	13913	460	3225	740	12975	5530	375	19590	793	7607	407	1116.66
71	2/22/3	10	3470	1500	3592	1754	2981	235	897	526	2158	430	1201	270	332	1269	798	3109	561	1559	139	44.80
72	2/22/4	10	3500	1500	3676	1821	3005	250	900	530	2180	440	1215	260	354	1273	807	3144	575	1575	125	45.98
73	2/22/5	10	3520	1500	3733	1866	3021	260	902	533	2195	446	1224	254	368	1276	813	3167	584	1586	116	46.76
74	2/23/3	10	4500	1500	6504	3500	3599	1200	1100	575	3375	585	1664	115	1697	1556	924	4887	827	2323	–127	96.10
75	2/23/4	10	4520	1500	6561	3522	3606	1228	1106	574	3408	584	1672	116	1737	1564	922	4933	828	2342	–128	97.33
76	2/23/5	10	4550	1500	6646	3556	3618	1270	1115	573	3458	584	1685	117	1796	1577	920	5003	829	2371	–129	99.18
77	2/32/3	10	3600	1500	3959	2044	3084	300	910	544	2254	472	1262	228	424	1287	838	3260	622	1628	78	50.04
78	2/32/4	10	3650	1500	4101	2155	3123	325	915	551	2291	488	1285	212	460	1294	854	3318	645	1655	55	52.14
79	2/32/5	10	3650	1500	4101	2155	3123	325	915	551	2291	488	1285	212	460	1294	854	3318	645	1655	55	52.14
70	2/33/3	10	4600	1500	6787	3612	3638	1340	1130	570	3540	582	1706	118	1895	1598	916	5119	831	2419	–131	102.33
71	2/33/4	10	4630	1500	6872	3646	3650	1382	1139	569	3590	581	1719	119	1954	1611	913	5189	832	2448	–132	104.24
72	2/33/5	10	4680	1500	7013	3703	3670	1452	1154	566	3672	580	1741	120	2053	1632	909	5305	834	2496	–134	107.48
73	3/22/3	10	3470	1500	3592	1754	2981	235	897	526	2158	430	1201	270	332	1269	798	3109	561	1559	139	44.80
74	3/22/4	10	3500	1500	3676	1821	3005	250	900	530	2180	440	1215	260	354	1273	807	3144	575	1575	125	45.98
75	3/22/5	10	3500	1500	3676	1821	3005	250	900	530	2180	440	1215	260	354	1273	807	3144	575	1575	125	45.98
76	3/33/3	10	4550	1500	6646	3556	3618	1270	1115	573	3458	584	1685	117	1796	1577	920	5003	829	2371	–129	99.18
77	3/33/4	10	4600	1500	6787	3612	3638	1340	1130	570	3540	582	1706	118	1895	1598	916	5119	831	2419	–131	102.33
78	3/33/5	10	4650	1500	6929	3669	3658	1410	1145	568	3623	581	1728	120	1994	1620	912	5235	833	2467	–133	105.53

NOTES:

FOR ALL NOTES REFER. DRG. NO. SD/113 (SHEET 4 OF 6)

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DIMENSION SCHEDULE FOR PCC WING WALL
(WITH EARTH CUSHION CASES)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO SD/113 (SHEET 5 OF 6)

TABLE No. – 5 (CONT...)

SALIENT DIMENSIONS OF PCC WING WALL
PCC (M20)

SL NO.	BOX DESIGNATION Nc\ab\Ec	NET SAFE BEARING CAPACITY T/Sqm	MAX.HT. HO (mm)	DEPTH OF FOUND. DF(mm)	LENGTH OF W.WALL WL(mm)	LENGTH BETWEEN SEC. 1–1 AND SEC. 2–2(mm)	SECTION 1–1								SECTION 3–3							TOTAL VOLUME OF CONCRETE IN WING WALL (cum.)
							HT.AT SEC 1–1 HS (mm)	C1S (mm)	C2S (mm)	C3S (mm)	BS (mm)	D1S (mm)	D2S (mm)	D4S (mm)	C1M (mm)	C2M (mm)	C3M (mm)	BM (mm)	D1M (mm)	D2M (mm)	D4M (mm)	
1	1/22/0	15	3550	1500	3818	1850	3015	330	933	482	2245	401	1264	299	467	1319	703	3198	524	1676	176	47.10
2	1/23/0	15	4570	1500	6702	3942	3755	885	1171	477	3033	568	1836	132	1252	1656	691	4309	762	2458	–62	96.76
3	1/33/0	15	4620	1500	6844	4043	3791	910	1186	475	3071	574	1866	126	1287	1677	687	4361	770	2500	–70	99.80
4	1/34/0	15	5650	1500	9757	4572	3978	2855	1625	460	5440	542	2086	158	4038	2298	651	7897	837	3483	–137	188.77
5	1/43/0	15	4650	1500	6929	4104	3812	925	1195	474	3094	578	1884	122	1309	1690	684	4392	774	2526	–74	101.65
6	1/44/0	15	5680	1500	9841	4561	3974	2936	1640	460	5536	538	2086	162	4152	2319	651	7833	838	3492	–138	191.99
7	1/45/0	15	7220	2000	12783	6330	5121	3218	2469	503	6690	739	3032	461	4551	3491	912	9665	1146	4724	54	434.89
8	1/53/0	10	4700	1500	7070	3725	3678	1480	1160	565	3705	579	1749	121	2093	1641	908	5352	835	2515	–135	108.79
9	1/54/0	15	5720	1500	9955	4546	3969	3044	1660	460	5664	534	2085	166	4305	2348	651	8014	838	3532	–138	196.32
10	1/55/0	15	7280	2000	12952	6353	5129	3332	2501	502	6835	736	3043	464	4712	3537	911	9870	1149	4781	51	446.95
11	1/63/0	10	4880	1500	7579	3929	3750	1732	1214	556	4002	574	1827	126	2449	1717	893	5770	841	2689	–141	121.04
12	1/64/0	15	5880	1500	10407	4487	3948	3476	1740	460	6176	514	2083	186	4916	2461	651	8738	840	3690	–140	214.14
13	1/65/0	15	7380	2000	13235	6392	5143	3522	2555	499	7076	731	3062	469	4981	3613	909	10213	1152	4878	48	467.50
14	1/66/0	15	8400	2000	16120	6520	5188	5740	3094	452	9786	652	3186	548	8118	4375	828	14031	1129	5921	71	705.94
15	1/75/0	15	7450	2000	13433	6419	5153	3655	2593	497	7245	728	3075	473	5189	3667	908	10454	1154	4946	46	482.21
16	1/76/0	15	8480	2000	16346	6498	5180	5948	3135	446	10029	642	3188	558	8412	4433	814	14369	1120	6010	80	726.57
17	1/77/0	15	9480	2000	19174	6183	5069	8500	3726	357	13084	503	3216	697	12021	5270	501	18502	890	7240	310	1022.71
18	1/85/0	15	7500	2000	13574	6439	5160	3750	2620	495	7365	725	3085	475	5304	3705	907	10625	1156	4994	44	492.89
19	1/86/0	15	8520	2000	16459	6486	5177	6052	3155	444	10151	638	3189	562	8559	4462	808	14539	1116	6054	84	737.01
20	1/87/0	15	9550	2000	19372	6158	5060	8675	3774	350	13299	492	3218	708	12268	5337	469	18784	865	7335	335	1046.53
21	2/22/0	10	3600	1500	3959	2044	3084	300	910	544	2254	472	1262	228	424	1287	838	3260	622	1628	78	50.04
22	2/23/0	15	4600	1500	6787	4002	3776	900	1180	476	3056	572	1854	128	1273	1668	689	4340	767	2483	–67	98.58
23	2/32/0	10	3650	1500	4101	2155	3123	325	915	551	2291	488	1285	212	460	1294	854	3318	845	1655	55	52.14
24	2/33/0	10	4670	1500	6985	3691	3666	1438	1151	567	3656	580	1736	120	2034	1628	910	5282	833	2487	–133	106.83
25	3/22/0	10	3570	1500	3874	1977	3060	285	907	540	2232	462	1248	238	403	1283	829	3225	608	1612	92	48.80
26	3/33/0	10	4650	1500	6929	3669	3658	1410	1145	568	3623	581	1728	120	1994	1620	912	5235	833	2467	–133	105.53

NOTES:

FOR ALL NOTES REFER. DRG. NO. SD/113 (SHEET 4 OF 6)

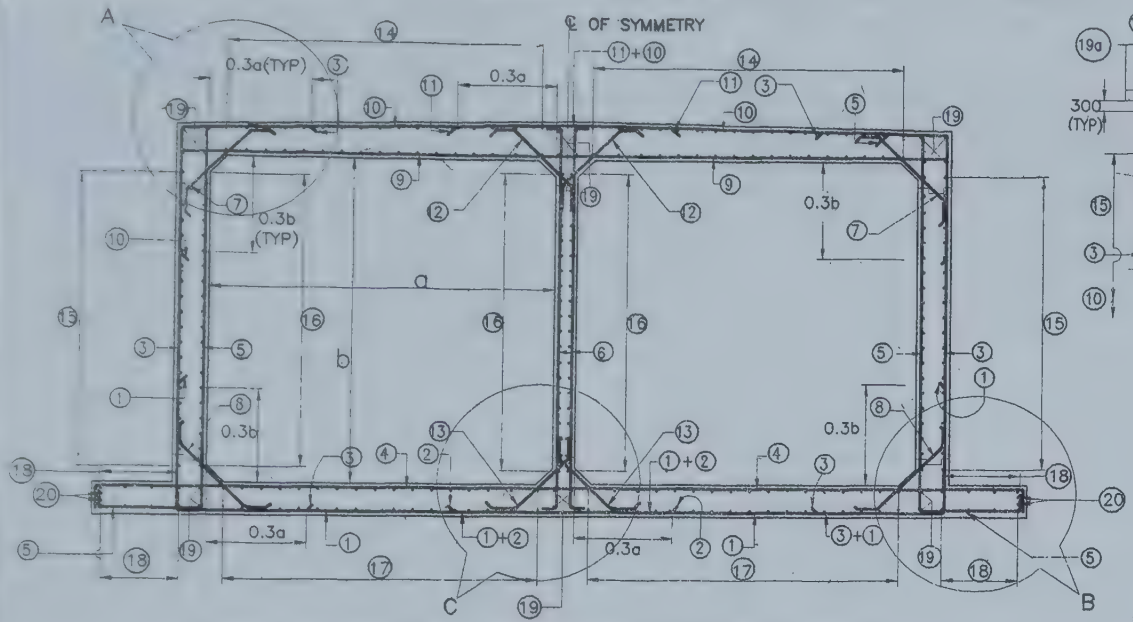
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

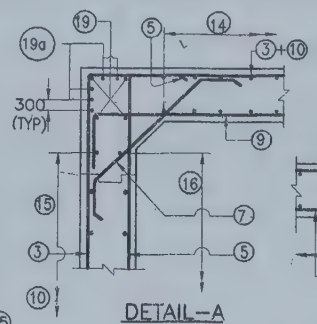
DIMENSION SCHEDULE FOR PCC WING WALL
(WITHOUT EARTH CUSHION CASES)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/113 (SHEET 6 OF 6)

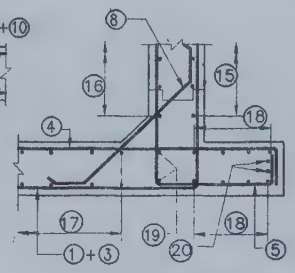
DRG.NO. SD/114 (SHEET 1 OF 4)



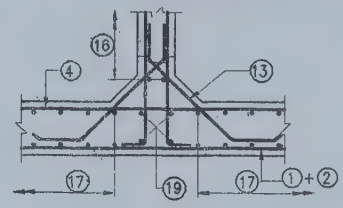
REINFORCEMENT DETAILS OF DOUBLE CELL BOX CULVERT



DETAIL–A



DETAIL–B



DETAIL– C

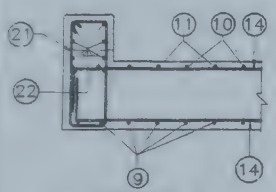
NOTES:

1. FOR GENERAL NOTES REFER DRG. NO. SD/101.
2. FOR GENERAL ARRANGEMENT REFER DRG. NO. SD/105.
3. FOR BAR BENDING SCHEDULE REFER DRAWING NO. SD/114 (SHEET 2 TO 4 OF 4)
4. FOR LAP ZONES REFER DRG. NO SD/117 (SHEET 1 OF 2)
6. BAR (19a) IS NOT SHOWN IN THE BAR BENDING SCHEDULE. THE NO OF (19a) BARS SHOULD BE DECIDED AT SITE BY ENGINEER–IN–CHARGE DEPENDING ON WALL/TOP SLAB THICKNESS AS PER MENTIONED SPACING IN DETAIL–A.

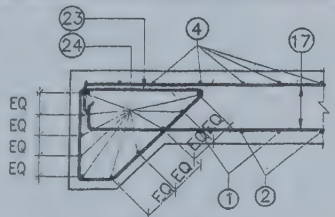
LEGEND :

——— : TOP FACE BARS/ OUTER FACE BARS

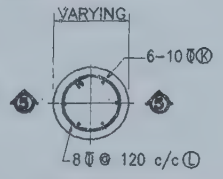
– – – – : BOTTOM FACE BARS/ INNER FACE BARS



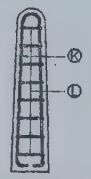
SECTION 1–1



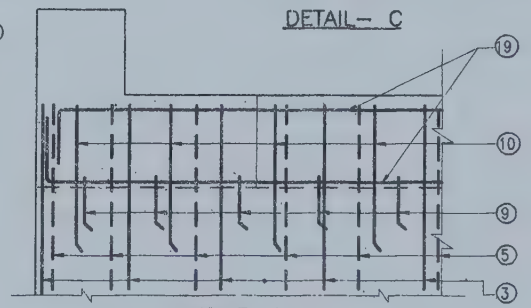
SECTION 2–2



SECTION 4–4



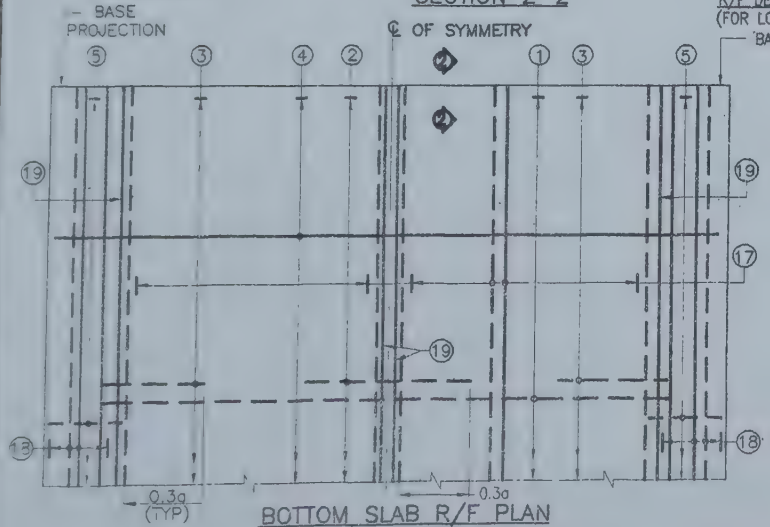
SECTION 5–5



VIEW 3–3

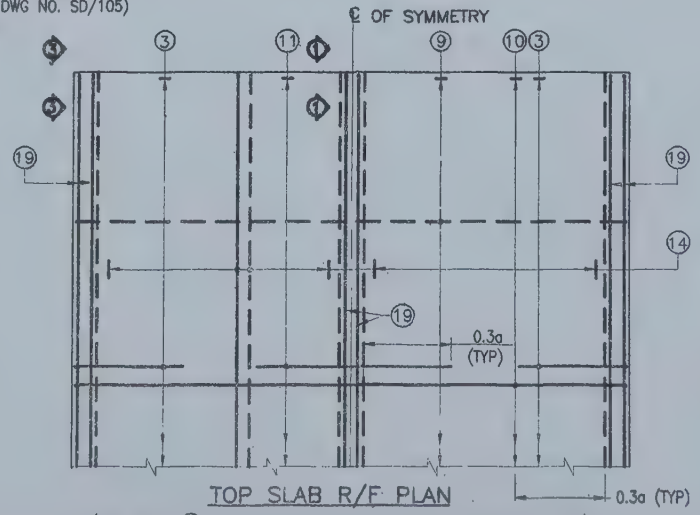
(BAR MARKS (19a) & HAUNCH LINES NOT SHOWN)

R/F DETAILS OF PRECAST GUARD STONE
(FOR LOCATION REFER DWG NO. SD/105)



BOTTOM SLAB R/F PLAN

(HAUNCH LINES NOT SHOWN IN PLAN)



TOP SLAB R/F PLAN

(BAR MARK (5), KERB LINES & HAUNCH LINES NOT SHOWN IN PLAN)

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DOUBLE CELL BOX CULVERT
(WITH EARTH CUSHION)
TYPICAL REINFORCEMENT DETAILS

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/114 (SHEET 1 OF 4)

DRG.NO. SD/114 (SHEET 2 OF 4)

SCHEDULE OF REINFORCEMENT

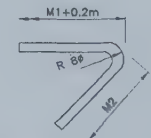
BAR MARK	BOX – CELL DESIGNATION Nc/ab/Ec / SHAPE OF BARS (NOT TO SCALE)	2/22/3								2/22/4								2/22/5								2/23/3							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	12	240	850	4650	8309	101	637.2	565.7	12	240	900	4650	6409	117	749.8	665.7	12	260	900	4690	6449	124	799.7	709.9	12	200	1200	4850	7209	121	872.3	774.4
②	M1	12	240	–	1450	1450	100	145.0	128.7	12	240	–	1450	1450	116	168.2	149.3	16	260	–	1450	1450	123	178.4	281.5	BAR IS NOT USED							
③	M1 M2 M1	10	240	800	2470	4036	204	823.3	507.6	10	240	800	2550	4116	238	971.3	598.8	10	260	820	2570	4176	250	1043.9	643.6	10	200	900	3550	5316	244	1297.0	799.7
④	M1 M2 M1	10	125	200	4650	5016	192	963.0	593.7	12	160	250	4650	5109	175	894.0	793.7	12	150	250	4690	5149	214	1101.8	978.2	12	180	250	4850	5309	134	711.4	631.6
⑤	0.2 M1 0.2 M2	10	200	2470	450	2869	242	694.3	428.0	10	250	2550	450	2949	226	666.5	410.9	10	200	2570	470	2989	322	962.4	593.4	10	200	3550	750	4249	242	1028.2	633.9
⑥	M2 M1	10	250	160	2470	2756	194	534.6	329.6	10	250	160	2550	2836	226	640.9	395.1	10	250	160	2570	2856	258	736.8	454.2	10	250	160	3550	3836	194	744.1	458.8
⑦	M2 M1	10	240	200	706	1059	202	213.9	131.9	10	240	200	749	1101	234	257.7	158.9	10	260	200	805	1158	248	287.2	177.0	10	200	200	890	1243	242	300.7	185.4
⑧	M1 M2 M1	10	240	200	749	1101	202	222.5	137.2	10	240	200	819	1172	234	274.3	169.1	10	260	200	848	1200	248	297.7	183.5	10	200	200	961	1313	242	317.9	196.0
⑨	M1 M2 M1	12	220	200	4638	4997	110	549.6	488.0	12	180	200	4638	4997	156	779.5	692.1	12	180	200	4678	5037	178	896.5	796.0	10	200	160	4840	5126	121	620.2	382.4
⑩	M2 M1 M1	10	240	820	4650	8290	101	635.3	391.7	12	240	850	4650	8350	117	743.0	659.6	12	260	870	4690	8430	124	797.3	707.9	12	200	1150	4850	7150	121	865.2	768.1
⑪	M1	16	240	–	1450	1450	100	145.0	228.9	16	240	–	1450	1450	116	168.2	265.5	16	260	–	1450	1450	123	178.4	281.5	12	200	–	1450	1450	120	174.0	154.5
⑫	M2 M1 M1	10	240	200	706	1059	202	213.9	131.9	10	240	200	749	1101	234	257.7	158.9	10	260	200	777	1130	248	280.1	172.7	10	200	200	749	1101	242	266.5	164.3
⑬	M1 M2 M1	10	240	200	749	1101	202	222.5	137.2	10	240	200	819	1172	234	274.3	169.1	10	260	200	819	1172	248	290.7	179.2	10	200	200	819	1172	242	283.6	174.9
⑭	M2 M1 M1	10	250	160	23848	24134	16	386.1	238.1	10	250	160	27848	28134	16	450.1	277.5	10	280	160	31848	32134	16	514.1	317.0	10	250	160	23848	24134	16	386.1	238.1
⑮	M2 M1 M1	10	250	160	23848	24134	16	386.1	238.1	10	250	160	27848	28134	16	450.1	277.5	10	250	160	31848	32134	16	514.1	317.0	10	250	175	23848	24164	24	579.9	357.5
⑯	M2 M1 M1	10	250	160	23848	24134	32	772.3	476.1	10	250	160	27848	28134	32	900.3	555.1	10	250	160	31848	32134	32	1028.3	634.0	10	250	160	23848	24134	48	1158.4	714.2
⑰	M2 M1 M1	10	250	160	23848	24134	32	772.3	476.1	10	250	175	27848	28164	32	901.2	555.6	10	250	175	31848	32164	32	1029.2	634.6	10	250	175	23848	24164	32	773.2	476.7
⑱	M2 M1 M1	10	250	160	23848	24134	12	289.6	178.6	10	250	175	27848	28164	12	338.0	208.4	10	250	175	31848	32164	12	386.0	238.0	10	250	175	23848	24164	12	290.0	178.8
⑲	M2 M1 M1	10	–	160	23848	24134	20	482.7	297.6	10	–	160	27848	28134	20	562.7	346.9	10	–	160	31848	32134	20	642.7	396.2	10	–	160	23848	24134	20	482.7	297.6
⑳	M2 M1 M1	BAR IS NOT USED								10	–	160	27848	28134	2	56.3	34.7	10	–	160	31848	32134	2	64.3	39.6	10	–	160	23848	24134	2	48.3	29.8
㉑	R1 M2	10	150	150	470	1271	64	81.4	50.2	10	150	150	500	1331	64	85.2	52.5	10	150	150	520	1371	66	90.5	55.8	10	150	150	500	1331	68	90.5	55.8
㉒	M1 M1 M2	10	–	160	4650	4936	16	79.0	48.7	10	–	160	4650	4936	16	79.0	48.7	10	–	160	4690	4976	16	79.6	49.1	10	–	160	4850	5136	16	82.2	50.7
㉓	M1+0.2m R 8ø M1 M2	10	150	1100	1556	4207	64	269.2	166.0	10	150	1100	1556	4207	64	269.2	166.0	10	150	1100	1556	4207	66	277.7	171.2	10	150	1100	1556	4207	68	286.1	176.4
㉔	M1 M1 M2	12	–	200	4650	5009	20	100.2	88.9	12	–	200	4650	5009	20	100.2	88.9	12	–	200	4690	5049	20	101.0	89.6	12	–	200	4850	5209	20	104.2	92.5
TOTAL STEEL (Kgs)		6458.3								7898.6								9100.8								7991.9							
TOTAL CONCRETE (cum)		117.86								147.06								173.62								166.85							

NOTES:

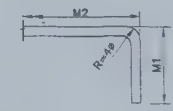
1. JOINT OR LAPPING OF BARS SHALL BE SUITABLY STAGGERED AS PER CLAUSE 304.6 OF IRC:21–1987
2. FULL SCALE ELEVATION FOR THE BARS SHALL BE LINED OUT ON A PLAIN PLASTERED FLOOR TO THE DIMENSIONS SHOWN ON THE DRAWING SO AS TO GET CORRECT CLEARENCE BETWEEN DIFFERENT BARS AND THEN THE BARS SHALL BE BENT TO PROPER SHAPE.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING No. SD/109 (SHEET 1 OF 16).
4. QUANTITY OF CONCRETE DOES NOT INCLUDE GUARD STONES.
5. QUANTITY OF STEEL DOES NOT INCULDE 5% EXTRA FOR WASTAGE AND LAPS.

BENDING OF BARS

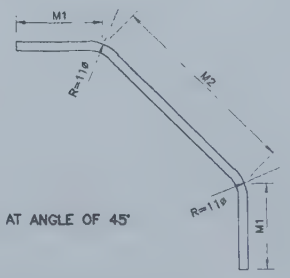
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DOUBLE CELL BOX CULVERT
2m x 2m TO 3m x 3m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/114 (SHEET 2 OF 4)

DRG.NO. SD/114 (SHEET 3 OF 4)

SCHEDULE OF REINFORCEMENT

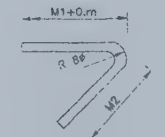
BAR MARK	SHAPE OF BARS (NOT TO SCALE) / BOX – CELL DESIGNATION No/ab/Ec	2/23/4								2/23/5								2/32/3								2/32/4							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①		16	280	1200	4850	7195	101	726.7	1147.0	16	260	1200	4910	7255	124	899.6	1419.9	12	250	970	6750	8649	97	838.9	744.8	12	200	1020	6750	8749	141	1233.6	1095.2
②		BAR IS NOT USED								10	260	–	1450	1450	123	178.4	110.0	16	250	–	2050	2050	96	196.8	310.6	18	200	–	2050	2050	140	287.0	453.0
③		12	280	900	3570	5329	204	1087.1	965.1	12	260	930	3600	5419	250	1354.7	1202.7	12	250	1150	2720	4979	196	975.8	866.4	10	200	1150	2820	5086	284	1444.3	890.5
④		12	160	250	4850	5309	175	929.0	824.8	12	150	250	4910	5369	214	1148.9	1020.0	12	120	320	6750	7349	200	1469.8	1304.9	16	180	370	6750	7435	156	1159.9	1830.7
⑤		10	200	3570	750	4269	282	1203.8	742.2	10	200	3600	680	4229	322	1361.7	839.5	10	200	2720	500	3169	242	766.9	472.8	10	200	2820	500	3269	282	921.8	568.3
⑥		10	250	160	3570	3856	226	871.4	537.2	10	250	160	3600	3886	258	1002.5	618.1	10	250	160	2720	3006	194	583.1	359.5	10	250	160	2820	3106	226	701.9	432.7
⑦		10	280	200	918	1271	202	256.7	158.3	10	260	200	1003	1356	248	336.3	207.3	10	250	200	961	1313	194	254.8	157.1	10	200	200	1031	1384	282	390.3	240.7
⑧		10	280	200	961	1313	202	265.3	163.6	10	260	200	1003	1356	248	336.3	207.3	10	250	200	989	1342	194	260.3	160.5	10	200	200	1060	1412	282	398.3	245.6
⑨		10	150	160	4840	5126	187	958.5	591.0	10	150	160	4900	5186	214	1109.7	684.2	12	150	200	6738	7097	160	1135.5	1008.1	12	130	200	6738	7097	216	1532.9	1360.9
⑩		12	280	1170	4850	7190	101	726.2	644.7	12	260	1200	4910	7310	124	906.4	804.8	12	250	950	6750	8650	97	839.1	744.9	12	200	1000	6750	8750	141	1233.8	1095.3
⑪		16	280	–	1450	1450	100	145.0	228.9	16	260	–	1450	1450	123	178.4	281.5	16	250	–	2050	2050	96	196.8	310.6	16	200	–	2050	2050	140	287.0	453.0
⑫		10	280	200	777	1130	202	228.2	140.7	10	260	200	819	1172	248	290.7	179.2	10	250	200	890	1243	194	241.1	148.6	10	200	200	961	1313	282	370.4	228.4
⑬		10	280	200	819	1172	202	236.7	146.0	10	260	200	819	1172	248	290.7	179.2	10	250	200	918	1271	194	246.6	152.0	10	200	200	989	1342	282	378.4	233.3
⑭		10	250	160	27848	28134	16	450.1	277.5	10	250	175	31848	32164	16	514.6	317.3	10	250	200	23848	24214	24	581.1	358.3	10	250	225	27848	28264	24	678.3	418.2
⑮		10	250	175	27848	28164	24	675.9	416.7	10	250	190	31848	32194	24	772.6	476.4	10	250	160	23848	24134	16	386.1	238.1	10	220	160	27848	28134	18	506.4	312.2
⑯		10	250	160	27848	28134	48	1350.4	832.6	10	250	160	31848	32134	48	1542.4	951.0	10	280	160	23848	24134	32	772.3	476.1	10	250	160	27848	28134	32	900.3	555.1
⑰		10	250	175	27848	28164	32	901.2	555.6	10	250	175	31848	32164	32	1029.2	634.8	10	220	210	23848	24234	56	1357.1	836.7	10	220	235	27848	28284	56	1583.9	976.5
⑱		10	250	175	27848	28164	12	338.0	208.4	10	250	175	31848	32164	12	386.0	238.0	10	220	210	23848	24234	12	290.8	179.3	10	250	235	27848	28284	12	339.4	209.3
⑲		18	–	160	27848	28134	20	562.7	346.9	10	–	160	31848	32134	20	642.7	396.2	10	–	160	23848	24134	20	482.7	297.6	10	–	160	27848	28134	20	562.7	346.9
⑳		10	–	160	27848	28134	2	56.3	34.7	10	–	160	31848	32134	2	64.3	39.6	10	–	160	23848	24134	2	48.3	29.8	10	–	160	27848	28134	2	56.3	34.7
㉑		10	150	150	520	1371	68	93.3	57.5	10	150	150	550	1431	68	97.3	60.0	10	150	150	600	1531	92	140.9	86.9	10	150	150	650	1631	92	150.1	92.5
㉒		10	–	160	4850	5136	16	82.2	50.7	10	–	160	4910	5196	16	83.1	51.3	10	–	160	6750	7036	16	112.6	69.4	10	–	160	6750	7036	16	112.6	69.4
㉓		10	150	1100	1556	4207	68	286.1	176.4	10	150	1100	1556	4207	68	286.1	176.4	10	150	1100	1556	4207	92	387.0	238.6	10	150	1100	1556	4207	92	387.0	238.6
㉔		12	–	200	4850	5209	20	104.2	92.5	12	–	200	4910	5269	20	105.4	93.6	12	–	200	6750	7109	20	142.2	126.2	12	–	200	6750	7109	20	142.2	126.2
TOTAL STEEL (Kgs)		9338.9								11187.9								9677.8								12507.2							
TOTAL CONCRETE (cum)		196.14								232.59								198.08								248.85							

NOTES:

1. FOR ALL NOTES REFER DRG. NO. SD/114 (SHEET 2 OF 4).

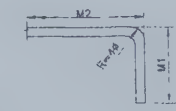
BENDING OF BARS

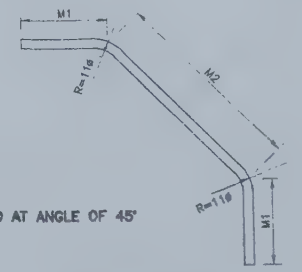
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°

BEND AT RIGHT ANGLE





BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DOUBLE CELL BOX CULVERT
2m x 2m TO 3m x 3m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1 S 9 9
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/114 (SHEET 3 OF 4)

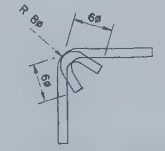
DRG.NO. SD/114 (SHEET 4 OF 4)

SCHEDULE OF REINFORCEMENT

BAR MARK	SHAPE OF BARS (NOT TO SCALE) / BOX – CELL DESIGNATION Nc/ab/Ec	2/32/5								2/33/3								2/33/4								2/33/5							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①		16	240	1050	6750	8795	134	1178.5	1860.1	12	200	1270	6850	9349	121	1131.2	1004.3	16	220	1300	6910	9455	128	1210.2	1910.2	16	200	1330	6950	9555	161	1538.4	2428.1
②		16	240	–	2050	2050	133	272.7	430.3	12	200	–	2050	2050	120	246.0	218.4	12	220	–	2050	2050	127	260.4	231.1	12	200	–	2050	2050	160	328.0	291.2
③		12	240	1150	2900	5159	270	1392.9	1236.6	12	200	1200	3720	6079	244	1483.2	1316.8	12	220	1230	3780	6199	258	1599.3	1419.9	10	200	1250	3860	6326	324	2049.5	1263.6
④		16	170	400	6750	7496	189	1416.6	2235.8	16	200	320	[illegible]	7435	121	899.6	1419.9	16	180	350	6910	7555	156	1178.6	1860.2	16	170	380	6950	7655	189	1446.8	2283.6
⑤		10	200	2900	500	3349	322	1078.3	664.8	10	200	3720	550	4219	242	1021.0	629.5	10	200	3780	580	4309	282	1215.1	749.2	10	200	3860	600	4409	322	1419.7	875.3
⑥		10	250	160	2900	3186	258	821.9	506.7	10	250	160	3720	4006	194	777.1	479.1	10	250	160	3780	4066	226	918.8	566.5	10	250	160	3860	4146	258	1069.6	659.4
⑦		10	240	200	1102	1456	268	389.9	240.4	10	200	200	1031	1384	242	335.0	206.5	10	220	200	1116	1469	256	376.1	231.9	10	200	200	1215	1568	322	504.9	311.3
⑧		10	240	200	1102	1455	268	389.9	240.4	10	200	200	1060	1412	242	341.8	210.7	10	220	200	1145	1497	256	383.3	236.3	10	200	200	1215	1568	322	504.9	311.3
⑨		12	120	200	6738	7097	267	1894.8	1682.3	12	170	200	6838	7197	142	1021.9	907.3	12	140	200	6898	7257	200	1451.4	1288.5	12	130	200	6938	7297	246	1795.0	1593.6
⑩		16	240	1050	6750	8850	134	1185.9	1871.8	12	200	1250	6850	9350	121	1131.4	1004.4	16	220	1280	6910	9470	128	1212.2	1913.2	12	200	1330	6950	9610	161	1547.2	1373.6
⑪		16	240	–	2050	2050	133	272.7	430.3	16	200	–	2050	2050	120	246.0	388.3	12	220	–	2050	2050	127	260.4	231.1	20	200	–	2050	2050	160	328.0	808.9
⑫		10	240	200	1031	1384	268	371.0	228.7	10	200	200	890	1243	242	300.7	185.4	10	220	200	932	1285	256	329.0	202.8	10	200	200	1003	1356	322	436.6	269.2
⑬		10	240	200	1031	1384	268	371.0	228.7	10	200	200	918	1271	242	307.6	189.6	10	220	200	961	1313	256	336.2	207.3	10	200	200	1003	1356	322	436.6	269.2
⑭		10	250	250	31848	32314	24	775.5	478.1	10	250	200	23848	24214	24	581.1	358.3	10	250	215	27848	28244	24	677.8	417.9	10	250	240	31848	32294	24	775.0	477.8
⑮		10	220	160	31848	32134	18	578.4	356.6	10	250	175	23848	24164	24	579.9	357.5	10	250	190	27848	28194	24	676.6	417.2	10	220	200	31848	32214	28	902.0	556.1
⑯		10	250	160	31848	32134	32	1028.3	634.0	10	250	160	23848	24134	48	1158.4	714.2	10	250	160	27848	28134	48	1350.4	832.6	10	250	160	31848	32134	48	1542.4	951.0
⑰		10	200	250	31848	32314	60	1938.8	1195.4	10	240	210	23848	24234	52	1260.2	776.9	10	220	225	27848	28264	56	1582.8	975.8	10	200	240	31848	32294	60	1937.6	1194.6
⑱		10	250	250	31848	32314	12	387.8	239.1	10	250	210	23848	24234	12	290.8	179.3	10	250	225	27848	28264	12	339.2	209.1	10	250	240	31848	32294	12	387.5	238.9
⑲		10	–	160	31848	32134	20	642.7	396.2	10	–	160	23848	24134	20	482.7	297.6	10	–	160	27848	28134	20	562.7	346.9	10	–	160	31848	32134	20	642.7	396.2
⑳		10	–	160	31848	32134	2	64.3	39.6	10	–	160	23848	24134	2	48.3	29.8	10	–	160	27848	28134	2	56.3	34.7	10	–	160	31848	32134	2	64.3	39.6
㉑		10	150	150	700	1731	92	159.3	98.2	10	150	150	600	1531	94	143.9	88.7	10	150	150	630	1591	94	149.6	92.2	10	150	150	680	1691	96	162.4	100.1
㉒		10	–	160	6750	7036	16	112.6	69.4	10	–	160	6850	7136	16	114.2	70.4	10	–	160	6910	7196	16	115.1	71.0	10	–	160	6950	7236	16	115.8	71.4
㉓		10	150	1100	1556	4207	92	387.0	238.8	10	150	1100	1556	4207	94	395.5	243.8	10	150	1100	1556	4207	94	395.5	243.8	10	150	1100	1556	4207	96	403.9	249.0
㉔		12	–	200	6750	7109	20	142.2	126.2	12	–	200	6850	7209	20	144.2	128.0	12	–	200	6910	7269	20	145.4	129.1	12	–	200	6950	7309	20	146.2	129.8
TOTAL STEEL (Kgs)		15728.5								11404.9								14816.6								17142.8							
TOTAL CONCRETE (cum)		300.92								227.87								282.77								345.20							

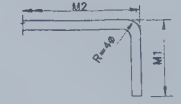
NOTES:

1. FOR ALL NOTES REFER DRG. NO. SD/114 (SHEET 2 OF 4).

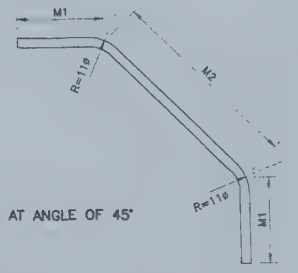


BEND WITH CLOSE HOOKS

BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

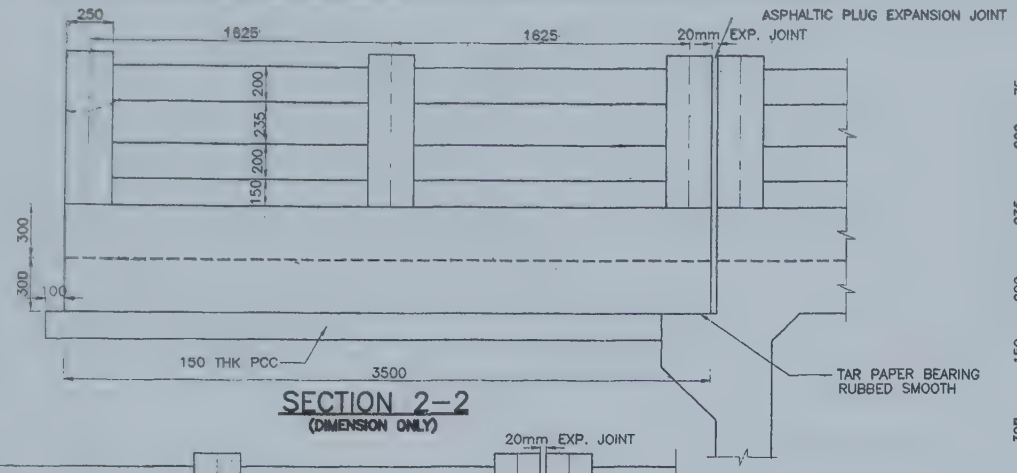
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

DOUBLE CELL BOX CULVERT
2m x 2m TO 3m x 3m
(WITH EARTH CUSHION)

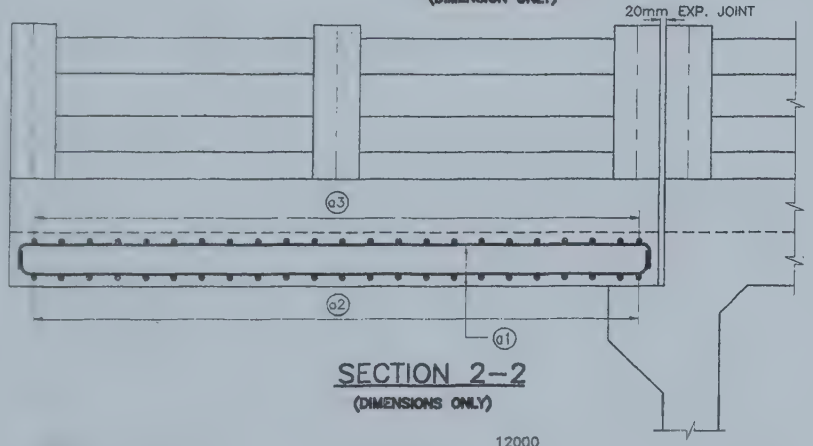
BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(N.C.TANDON) TCPL	(C.C.BHATTACHARYA) CE (R) S&R MOST	DRG. NO. SD/114 (SHEET 4 OF 4)

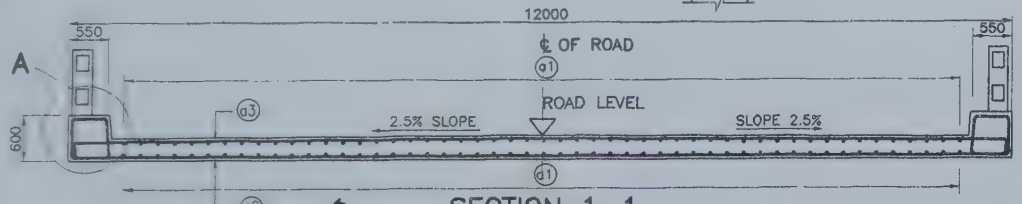
DRG.NO. SD/115 (SHEET 1 OF 4)



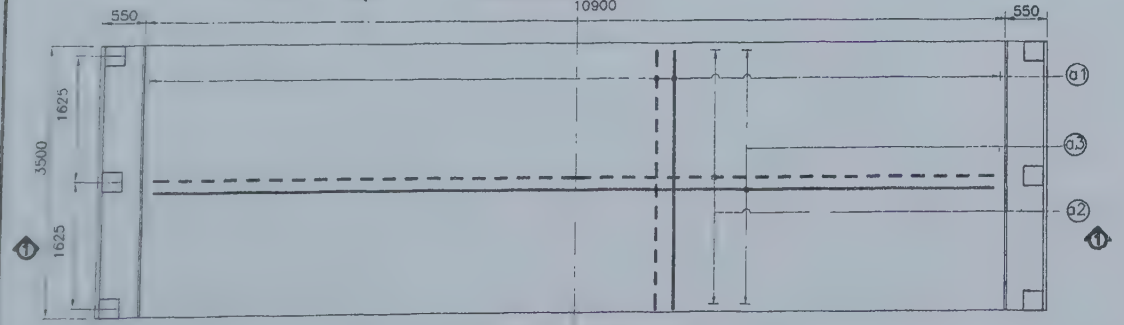
SECTION 2–2
(DIMENSION ONLY)



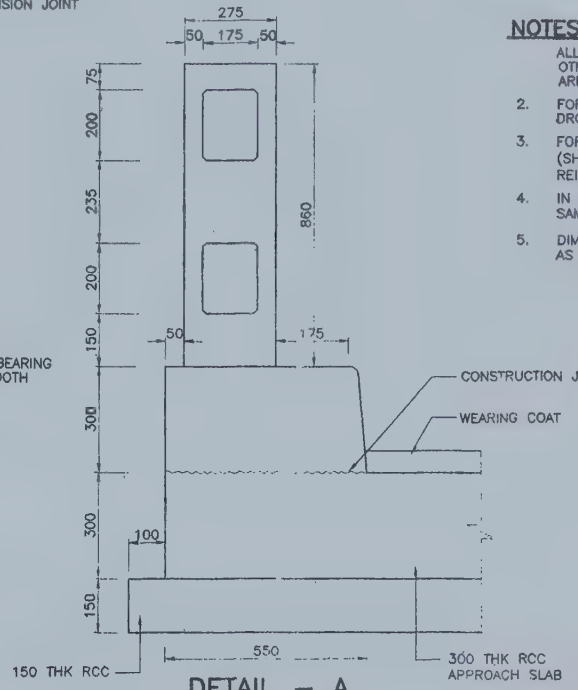
SECTION 2–2
(DIMENSIONS ONLY)



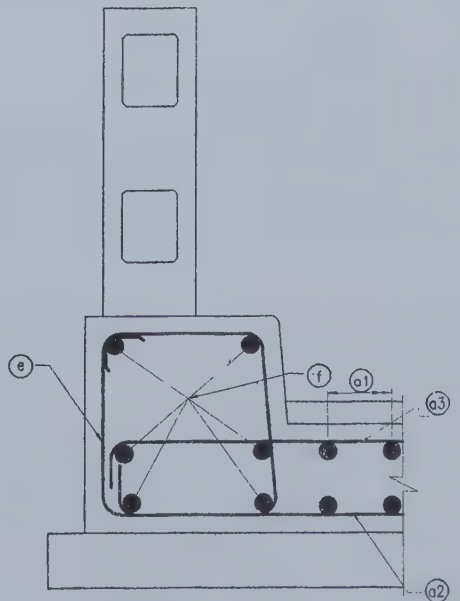
SECTION 1–1



PLAN OF APPROACH SLAB



DETAIL – A
(DIMENSIONS ONLY)



DETAIL – A
(REINFORCEMENT ONLY)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. FOR REINFORCEMENT DETAIL OF RAILING REFER DRG. NO.SD/115 (SHEET 2 OF 4).
3. FOR SCHEDULE OF REINFORCEMENT, REFER DRG.NO.SD–112 (SHEET 3 OF 3) DOES NOT INCLUDE CHANGE IN REINFORCEMENT AROUND RAILING & DRAINAGE SPOUT.
4. IN CASE OTHER TYPE OF RAILING IS USED, THE WEIGHT OF SAME ON EACH SIDE SHALL NOT EXCEED 3MT. PER METRE.
5. DIMENSIONS IN SCHEDULE OF REINFORCEMENT ARE GIVEN AS PER IS 2502.

BAR MKD.	REINFORCEMENT
a1	12 ⌀ @ 150 c/c
a2	12 ⌀ @ 150 c/c
a3	12 ⌀ @ 150 c/c
e	10 ⌀ 2L stirrups @ 150 c/c
f	6Nos.10 ⌀

LEGEND :

——— : TOP FACE BARS/ OUTER FACE BARS

– – – – : BOTTOM FACE BARS/ INNER FACE BARS

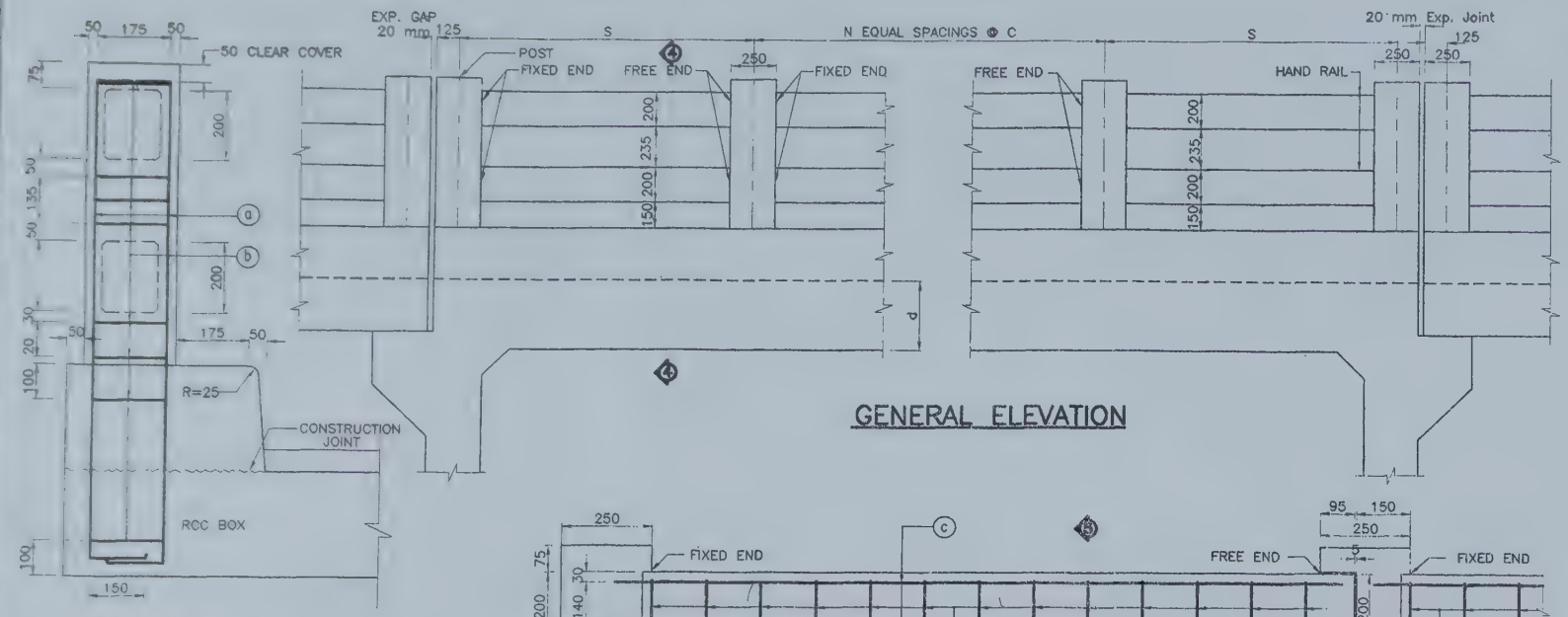
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

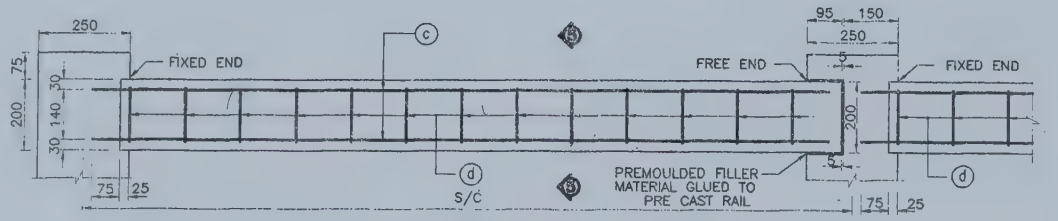
MISCELLANEOUS DETAILS APPROACH SLAB
(WITHOUT EARTH CUSHION)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/115 (SHEET 1 OF 4)

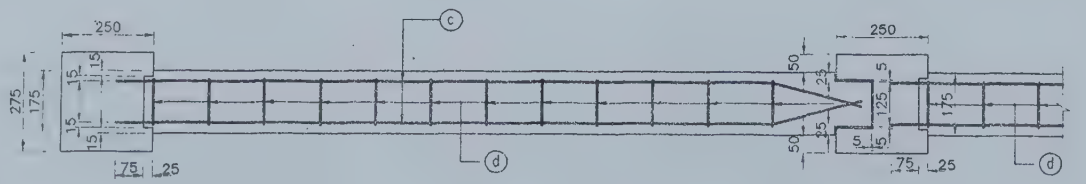
DRG.NO. SD/115 (SHEET 2 OF 4)



GENERAL ELEVATION

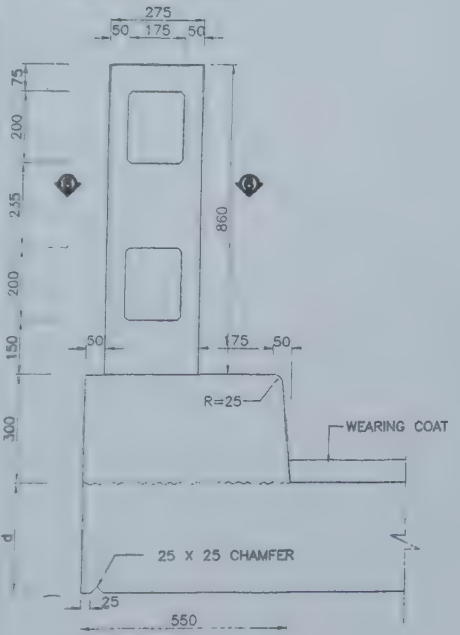


SECTION ELEVATION

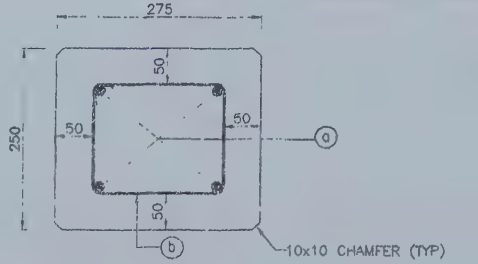


PLAN

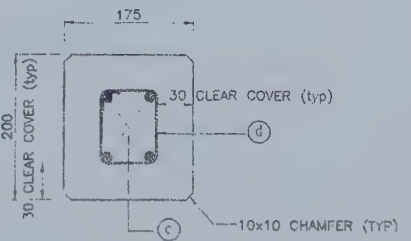
DETAIL OF PRECAST HANDRAIL



SECTION 4-4
(DIMENSIONS ONLY)



SECTION 6-6



SECTION 5-5

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. REINFORCEMENT OF RAILING POST SHOULD BE SUITABLE ANCHORED IN TOP SLAB OF BOX CULVERT.
3. CASTING OF POST SHALL BE DONE IN SINGLE POUR AFTER ACCURATELY POSITIONING THE PRECAST HANDRAIL.
4. FOR DETAILS & NUMBER OF POST & SPACING REFER DWG.NO. SD-115 (SHEET 4 OF 4).
5. FOR SCHEDULE OF REINFORCEMENT, REFER DRG.NO. SD-115 (SHEET 4 OF 4).

BAR MKD.	REINFORCEMENT
a	4Nos.12 ⌀
b	8Nos.2L-8 ⌀ stirrups
c	4Nos.8 ⌀
d	8 ⌀ 2L stirrups @ 100 c/c

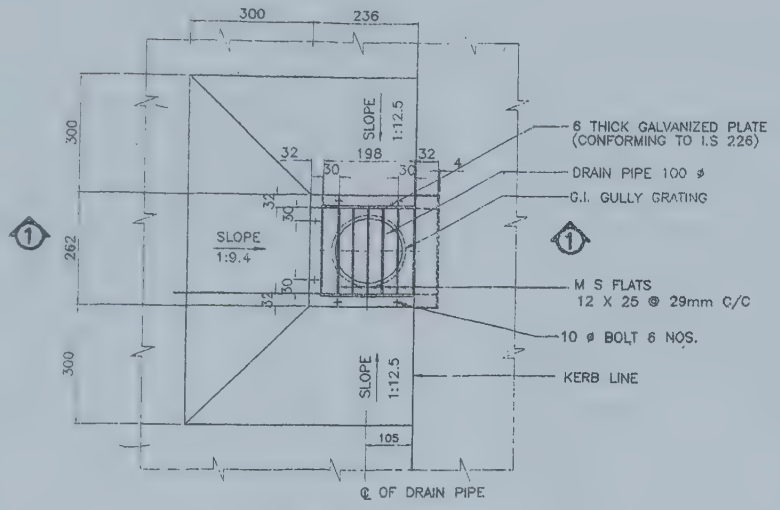
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

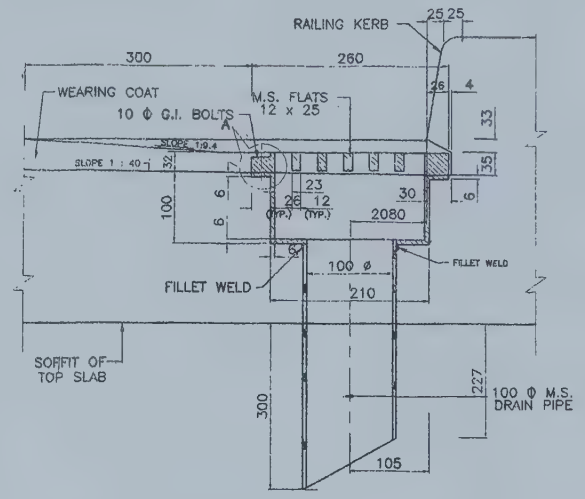
MISCELLANEOUS DETAILS RCC RAILING

(WITHOUT EARTH CUSHION)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C C BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/115 (SHEET 2 OF 4)



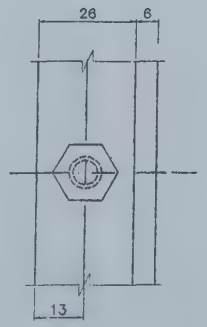
PLAN
DETAILS OF DRAINAGE SPOUT AND COLLECTION PIT



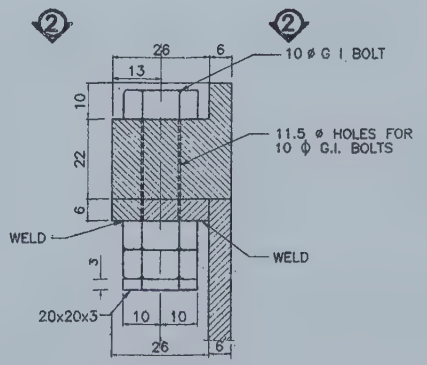
SECTION 1–1

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE MENTIONED ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
2. THE REINFORCEMENT OF TOP SLAB OF BOX SHALL BE SUITABLY MODIFIED TO ACCOMMODATE THE DRAINAGE SPOUT.
3. THE DRAINAGE SPOUT SHALL BE GALVANIZED AFTER WELDING THE PLATES & FLATS.
4. FOR DRAINAGE SPOUT LOCATION REFER DETAIL–B CORRESPONDING G A DRAWING.



PLAN AT 2–2



DETAIL –A

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

MISCELLANEOUS DETAILS DRAINAGE SPOUT
(WITHOUT EARTH CUSHION)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/115 (SHEET 3 OF 4)

DRG.NO. SD/115 (SHEET 4 OF 4)

TABLE: BAR BENDING SCHEDULE FOR RAILINGS AND POSTS

BOX - CELL DESIGNATION N/ab/EC	TOTAL TOP WIDTH TB (mm)	RAILING POST S (mm)	RAILING POST C (mm)	RAILING POST N (mm)	BAR MKD.– ⓐ 12 ϕ 4 NOS. PER POST — LENGTH l (mm)	ⓐ NOS. n=2a+p	ⓐ TOTAL LENGTH bm (m)	ⓐ WEIGHT w1 (kg)	BAR MKD.– ⓑ 8 ϕ RINGS 8 NOS. PER POST — LENGTH l (mm)	ⓑ NOS. n=2a+p	ⓑ TOTAL LENGTH bm (m)	ⓑ WEIGHT w1 (kg)	END RAILING BAR MKD.– ⓒ 8 ϕ 4 NOS. PER RAIL — LENGTH l (mm)	ⓒ NOS. n=2a+p	ⓒ TOTAL LENGTH bm (m)	ⓒ WEIGHT w1 (kg)	INTERMEDIATE RAILING BAR MKD.– ⓒ 8 ϕ 4 NOS. PER RAIL — LENGTH l (mm)	ⓒ NOS. n=2a+p	ⓒ TOTAL LENGTH bm (m)	ⓒ WEIGHT w1 (kg)	END RAILING BAR MKD.– ⓓ 8 ϕ RINGS @ 100c/c — LENGTH l (mm)	ⓓ NOS. n=2a+p	ⓓ TOTAL LENGTH bm (m)	ⓓ WEIGHT w1 (kg)	INTERMEDIATE RAILING BAR MKD.– ⓓ 8 ϕ RINGS @ 100c/c — LENGTH l (mm)	ⓓ NOS. n=2a+p	ⓓ TOTAL LENGTH bm (m)	ⓓ WEIGHT w1 (kg)
1/22/0	2600	1175	0	0	1593.80	24	38.25	33.96	677.33	48	32.51	12.83	1100.00	32	35.20	13.89	0.00	0	0.00	0.00	537.33	80	42.99	16.96	0.00	0	0.00	0.00
1/23/0	2700	1225	0	0	1613.80	24	38.73	34.39	677.33	48	32.51	12.83	1150.00	32	36.80	14.52	0.00	0	0.00	0.00	537.33	80	42.99	16.96	0.00	0	0.00	0.00
1/33/0	3840	1500	590	1	1663.80	32	53.24	47.27	677.33	64	43.35	17.10	1425.00	32	45.60	17.99	515.00	16	8.24	3.25	537.33	104	55.88	22.05	537.33	16	8.60	3.39
1/34/0	3920	1500	670	1	1693.80	32	54.20	48.12	677.33	64	43.35	17.10	1425.00	32	45.60	17.99	595.00	16	9.52	3.76	537.33	104	55.88	22.05	537.33	20	10.75	4.24
1/43/0	5000	1500	875	2	1693.80	40	67.75	60.15	677.33	80	54.19	21.38	1425.00	32	45.60	17.99	800.00	32	25.60	10.10	537.33	104	55.88	22.05	537.33	56	30.09	11.87
1/44/0	5100	1500	925	2	1723.80	40	68.95	61.22	677.33	80	54.19	21.38	1425.00	32	45.60	17.99	850.00	32	27.20	10.73	537.33	104	55.88	22.05	537.33	56	30.09	11.87
1/45/0	5260	1500	1005	2	1763.80	40	70.55	62.64	677.33	80	54.19	21.38	1425.00	32	45.60	17.99	930.00	32	29.76	11.74	537.33	104	55.88	22.05	537.33	64	34.39	13.57
1/53/0	6140	1500	1445	2	1743.80	40	69.75	61.93	677.33	80	54.19	21.38	1425.00	32	45.60	17.99	1370.00	32	43.84	17.30	537.33	104	55.88	22.05	537.33	96	51.58	20.35
1/54/0	6240	1500	1495	2	1763.80	40	70.55	62.64	677.33	80	54.19	21.38	1425.00	32	45.60	17.99	1420.00	32	45.44	17.93	537.33	104	55.88	22.05	537.33	104	55.88	22.05
1/55/0	6400	1500	1050	3	1823.80	48	87.54	77.72	677.33	96	65.02	25.66	1425.00	32	45.60	17.99	975.00	48	46.80	18.47	537.33	104	55.88	22.05	537.33	96	51.58	20.35
1/63/0	7440	1500	1397	3	1923.80	48	92.34	81.98	677.33	96	65.02	25.66	1425.00	32	45.60	17.99	1321.67	48	63.44	25.03	537.33	104	55.88	22.05	537.33	144	77.38	30.53
1/64/0	7500	1500	1417	3	1923.80	48	92.34	81.98	677.33	96	65.02	25.66	1425.00	32	45.60	17.99	1341.67	48	64.40	25.41	537.33	104	55.88	22.05	537.33	144	77.38	30.53
1/65/0	7500	1500	1417	3	1923.80	48	92.34	81.98	677.33	96	65.02	25.66	1425.00	32	45.60	17.99	1341.67	48	64.40	25.41	537.33	104	55.88	22.05	537.33	144	77.38	30.53
1/66/0	7700	1500	1483	3	1943.80	48	93.30	82.84	677.33	96	65.02	25.66	1425.00	32	45.60	17.99	1408.33	48	67.60	26.67	537.33	104	55.88	22.05	537.33	156	83.82	33.08
1/75/0	8700	1500	1363	4	1993.80	56	111.65	99.13	677.33	112	75.86	29.93	1425.00	32	45.60	17.99	1287.50	64	82.40	32.51	537.33	104	55.88	22.05	537.33	192	103.17	40.71
1/76/0	8900	1500	1413	4	2023.80	56	113.33	100.62	677.33	112	75.86	29.93	1425.00	32	45.60	17.99	1337.50	64	85.60	33.78	537.33	104	55.88	22.05	537.33	192	103.17	40.71
1/77/0	8900	1500	1413	4	2023.80	56	113.33	100.62	677.33	112	75.86	29.93	1425.00	32	45.60	17.99	1337.50	64	85.60	33.78	537.33	104	55.88	22.05	537.33	192	103.17	40.71
1/85/0	9900	1500	1330	5	2043.80	64	130.80	116.13	677.33	128	86.70	34.21	1425.00	32	45.60	17.99	1255.00	80	100.40	39.62	537.33	104	55.88	22.05	537.33	220	118.21	46.64
1/86/0	10000	1500	1350	5	2063.80	64	132.08	117.27	677.33	128	86.70	34.21	1425.00	32	45.60	17.99	1275.00	80	102.00	40.25	537.33	104	55.88	22.05	537.33	220	118.21	46.64
1/87/0	10400	1500	1430	5	2093.80	64	134.00	118.97	677.33	128	86.70	34.21	1425.00	32	45.60	17.99	1355.00	80	108.40	42.77	537.33	104	55.88	22.05	537.33	240	128.96	50.89
2/22/0	5040	1500	895	2	1643.80	40	65.75	58.38	677.33	80	54.19	21.38	1425.00	32	45.60	17.99	820.00	32	26.24	10.35	537.33	104	55.88	22.05	537.33	56	30.09	11.87
2/23/0	5100	1500	925	2	1643.80	40	65.75	58.38	677.33	80	54.19	21.38	1425.00	32	45.60	17.99	850.00	32	27.20	10.73	537.33	104	55.88	22.05	537.33	56	30.09	11.87
2/32/0	7100	1500	1283	3	1693.80	48	81.30	72.18	677.33	96	65.02	25.66	1425.00	32	45.60	17.99	1208.33	48	58.00	22.89	537.33	104	55.88	22.05	537.33	132	70.93	27.99
2/33/0	7190	1500	1313	3	1713.80	48	82.26	73.03	677.33	96	65.02	25.66	1425.00	32	45.60	17.99	1238.33	48	59.44	23.45	537.33	104	55.88	22.05	537.33	132	70.93	27.99
3/22/0	7340	1500	1363	3	1613.80	48	77.46	68.77	677.33	96	65.02	25.66	1425.00	32	45.60	17.99	1288.33	48	61.84	24.40	537.33	104	55.88	22.05	537.33	144	77.38	30.53
3/33/0	10740	1500	1498	5	1693.80	64	108.40	96.24	677.33	128	86.70	34.21	1425.00	32	45.60	17.99	1423.00	80	113.84	44.92	537.33	104	55.88	22.05	537.33	260	139.71	55.13
App Slab	3500	1625	0	0	1543.80	48	74.10	65.79	677.33	96	65.02	25.66	1550.00	64	99.20	39.14	0.00	0	0.00	0.00	537.33	224	120.36	47.49	0.00	0	0.00	0.00

BOX - CELL DESIGNATION N/ab/EC	BAR MKD.– ⓔ 10 ϕ RINGS @ 150 C/C IN KERB — LENGTH l (mm)	ⓔ NOS. n=2a+p	ⓔ TOTAL LENGTH bm (m)	ⓔ WEIGHT w1 (kg)	BAR MKD.– ⓕ 10 ϕ 6 NOS. PEP KERB — LENGTH l (mm)	ⓕ NOS. n=2a+p	ⓕ TOTAL LENGTH bm (m)	ⓕ WEIGHT w1 (kg)	TOTAL WEIGHT (kg)
1/22/0	2040.58	34	69.38	42.78	2665.66	12	31.99	19.72	140.1
1/23/0	2082.31	36	74.96	46.22	2765.66	12	33.19	20.46	145.4
1/33/0	2186.65	50	109.33	67.41	3905.66	12	46.87	28.90	207.4
1/34/0	2249.26	52	116.96	72.11	3985.66	12	47.83	29.49	214.9
1/43/0	2249.26	66	148.45	91.53	5065.66	12	60.79	37.48	272.6
1/44/0	2311.86	68	157.21	96.92	5165.66	12	61.99	38.22	280.4
1/45/0	2395.33	70	167.67	103.38	5325.66	12	63.91	39.40	292.2
1/53/0	2353.60	82	192.99	118.99	6205.66	12	74.47	45.91	325.9
1/54/0	2395.33	82	196.42	121.10	6305.66	12	75.67	46.65	331.8
1/55/0	2520.54	84	211.73	130.54	6465.66	12	77.59	47.84	360.6
1/63/0	2729.22	98	267.46	164.90	7505.66	12	90.07	55.53	423.7
1/64/0	2729.22	100	272.92	168.27	7565.66	12	90.79	55.97	427.9
1/65/0	2729.22	100	272.92	168.27	7565.66	12	90.79	55.97	427.9
1/66/0	2770.96	102	282.84	174.26	7765.66	12	93.19	57.45	440.0
1/75/0	2875.30	116	333.53	205.64	8765.66	12	105.19	64.85	512.8
1/76/0	2937.90	118	346.67	213.74	8965.66	12	107.59	66.33	525.1
1/77/0	2937.90	118	346.67	213.74	8965.66	12	107.59	66.33	525.1
1/85/0	2979.64	132	393.31	242.49	9965.66	12	119.59	73.73	592.9
1/86/0	3021.37	132	398.82	245.89	10065.66	12	120.79	74.47	598.8
1/87/0	3083.98	138	425.59	262.39	10465.66	12	125.59	77.43	626.7
2/22/0	2144.92	66	141.56	87.28	5105.66	12	61.27	37.77	267.1
2/23/0	2144.92	68	145.85	89.92	5165.66	12	61.99	38.22	270.5
2/32/0	2249.26	94	211.43	130.35	7165.66	12	85.99	53.01	372.1
2/33/0	2290.99	96	219.94	135.60	7255.66	12	87.07	53.68	379.5
3/22/0	2082.31	98	204.07	125.82	7405.66	12	88.87	54.79	370.0
3/33/0	2249.26	142	319.39	196.92	10805.66	12	129.67	79.95	547.4
App Slab	1936.24	92	178.13	109.83	3565.66	24	85.58	52.76	340.7

TABLE: BAR BENDING SCHEDULE FOR APPROACH SLAB

BAR MKD.– ⓖ1 12 ϕ @150c/c — LENGTH l (mm)	ⓖ1 NOS.	ⓖ1 TOTAL LENGTH (m)	ⓖ1 WEIGHT (kg)	BAR MKD.– ⓖ2 12 ϕ @150c/c — LENGTH (mm)	ⓖ2 NOS. n=2a+p	ⓖ2 TOTAL LENGTH bm (m)	ⓖ2 WEIGHT w1 (kg)	BAR MKD.– ⓗ 12 ϕ @150c/c — LENGTH (mm)	ⓗ NOS.	ⓗ TOTAL LENGTH (m)	ⓗ WEIGHT (kg)	TOTAL WEIGHT (kg)
3758.8	292	1097.57	974.44	11159	46	513.30	455.72	11162.8	46	513.49	455.88	1886.04

1. FOR GENERAL NOTES REFER DWG. NO. SD/101
2. THIS DRAWING SHALL BE READ IN CONJUNCTION TO DWG. NO SD/115 (SHEET 1&2 OF 4)

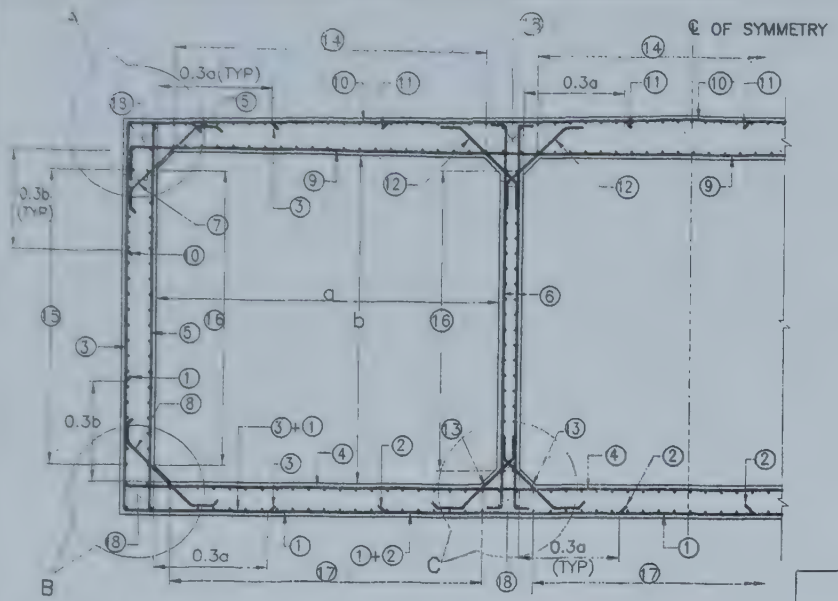
GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

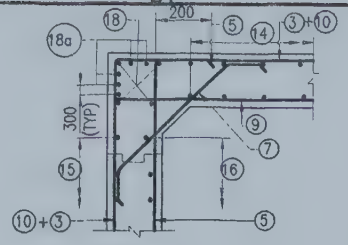
MISCELLANEOUS DETAILS (BARBENDING SCHEDULE)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/115 (SHEET 4 OF 4)

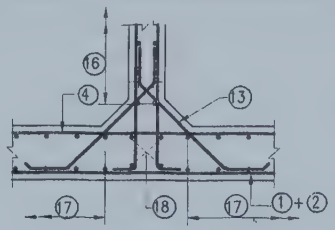
DRG.NO. SD/116 (SHEET 1 OF 3)



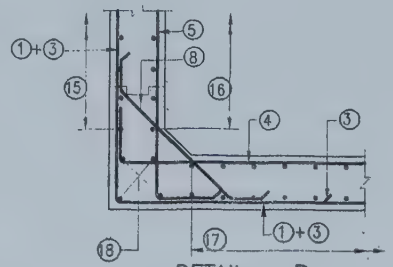
REINFORCEMENT DETAILS OF THREE CELL BOX CULVERT



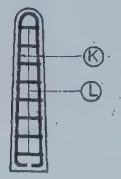
DETAIL– A



DETAIL C



DETAIL – B



SECTION 5–5

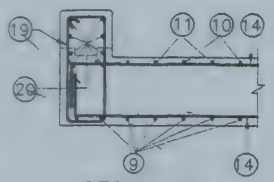
NOTES:

1. FOR GENERAL NOTES REFER DRG. NO. SD/101.
2. FOR GENERAL ARRANGEMENT REFER DRG. NO. SD/107
3. FOR BAR BENDING SCHEDULE REFER DRAWING NO. SD/116 (SHEET 2 & 3 OF 3)
4. FOR LAP ZONES REFER DRG. NO. SD/117 (SHEET 1 OF 2)
6. BAR (18a) IS NOT SHOWN IN THE BAR BENDING SCHEDULE. THE NO OF (18a) BAR SHOULD BE DECIDED AT SITE BY ENGINEER–IN–CHARGE DEPENDING ON WALL/TOP SLAB THICKNESS AS PER MENTIONED SPACING IN DETAIL–A.

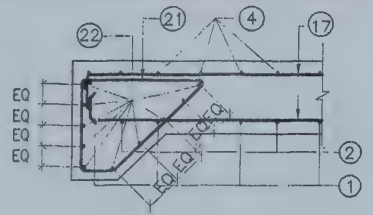
LEGEND :

——————— TOP FACE BARS/ OUTER FACE BARS

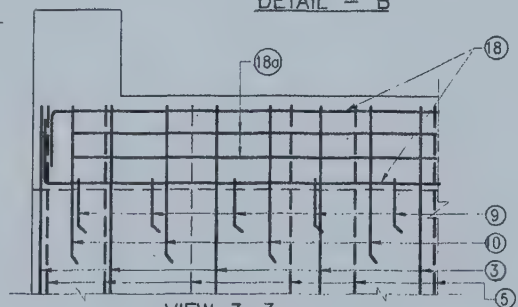
– – – – – – BOTTOM FACE BARS/ INNER FACE BARS



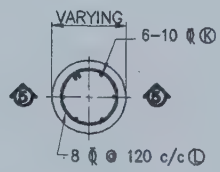
SECTION 1–1



SECTION 2–2

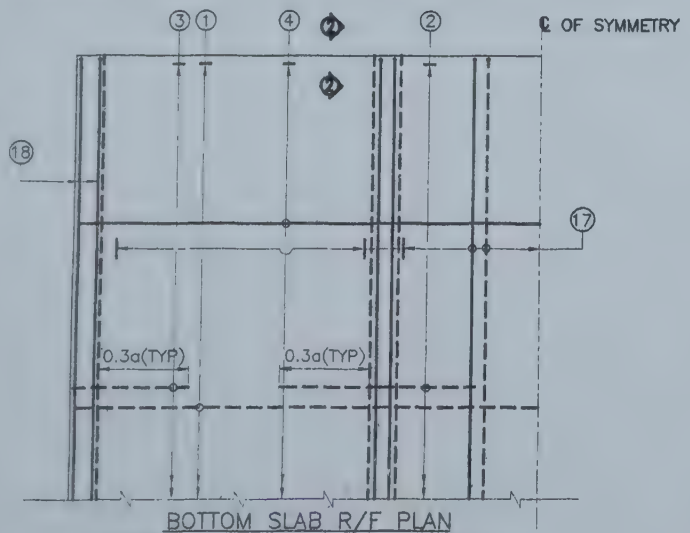


VIEW 3–3
(HAUNCH LINES NOT SHOWN)

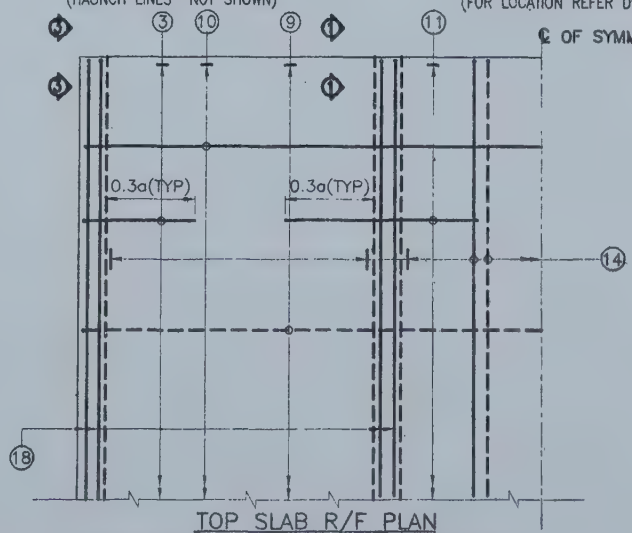


SECTION 4–4

R/F DETAILS OF PRECAST GUARD STONE
(FOR LOCATION REFER DWG NO.SD/107)



BOTTOM SLAB R/F PLAN
(HAUNCH LINES & BAR MARK ⑤ NOT SHOWN IN PLAN)



TOP SLAB R/F PLAN
(KERB, HAUNCH LINES & BAR MARK ⑤ NOT SHOWN IN PLAN)

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

TRIPLE CELL BOX CULVERT
(WITH EARTH CUSHION)
TYPICAL REINFORCEMENT DETAILS

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TOPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/116 (SHEET 1 OF 3)

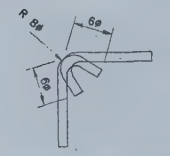
SCHEDULE OF REINFORCEMENT

BAR MARK	SHAPE OF BARS (NOT TO SCALE) / BOX – CELL DESIGNATION Nc/ab/Ec	3/22/3								3/22/4								3/22/5							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	12	250	850	6900	8600	97	834.2	740.8	12	240	870	7000	8740	117	1022.8	907.9	12	260	900	6960	8760	124	1086.2	964.4
②	M1	12	250	–	1450	1450	192	278.4	247.2	12	240	–	1450	1450	232	336.4	298.7	16	260	–	1450	1450	246	356.7	563.0
③	M1 M2 M1	10	250	800	2470	4070	196	797.7	491.8	10	240	850	2520	4220	236	995.9	614.0	12	260	830	2550	4210	250	1052.5	934.4
④	M1 M1 M2	12	180	200	6900	7300	134	978.2	868.5	12	160	200	7000	7400	175	1295.0	1149.7	12	150	200	6960	7360	214	1575.0	1398.3
⑤	0.2 M1 0.2 M2	10	200	160	2470	2790	242	675.2	416.3	10	200	160	2520	2840	282	800.9	493.8	10	200	160	2550	2870	322	924.1	569.8
⑥	M1 M2 M1	10	250	160	2470	2790	388	1082.5	667.4	10	250	160	2520	2840	452	1283.7	791.4	10	250	160	2550	2870	516	1480.9	913.0
⑦	M1 M2 M1	10	250	200	706	1106	194	214.6	132.3	10	240	200	819	1219	234	285.3	175.9	10	260	200	791	1191	248	295.3	182.1
⑧	M1 M2 M1	10	250	200	749	1148	194	222.8	137.4	12	240	200	848	1247	234	291.9	258.2	10	260	200	862	1262	248	312.9	192.9
⑨	M1 M2 M1	10	160	160	6890	7210	150	1081.5	666.8	12	200	200	6988	7388	141	1041.7	924.8	12	170	200	6948	7348	189	1388.8	1233.0
⑩	M1 M2 M1	12	250	820	6900	8540	97	828.4	735.4	10	240	850	7000	8700	117	1017.9	627.6	12	260	850	6960	8660	124	1073.8	953.4
⑪	M1	12	250	–	1450	1450	192	278.4	247.2	16	240	–	1450	1450	232	336.4	531.0	16	260	–	1450	1450	246	356.7	563.0
⑫	M1 M2 M1	10	250	200	706	1106	388	429.1	264.6	10	240	200	749	1148	468	537.5	331.4	10	260	200	749	1148	496	569.6	351.2
⑬	M1 M2 M1	10	250	200	749	1148	388	445.6	274.7	10	240	200	777	1177	468	550.7	339.5	10	260	200	819	1219	496	604.7	372.8
⑭	M1 M2 M1	10	250	160	23848	24168	48	1160.1	715.2	10	250	160	27848	28168	48	1352.1	833.6	10	250	160	31848	32168	48	1544.1	952.0
⑮	M1 M2 M1	10	250	160	23848	24168	16	386.7	238.4	10	250	160	27848	28168	16	450.7	277.9	10	250	160	31848	32168	16	514.7	317.3
⑯	M1 M2 M1	10	250	160	23848	24168	48	1160.1	715.2	10	250	160	27848	28168	48	1352.1	833.6	10	250	160	31848	32168	48	1544.1	952.0
⑰	M1 M2 M1	10	250	160	23848	24168	48	1160.1	715.2	10	250	160	27848	28168	48	1352.1	833.6	10	250	160	31848	32168	48	1544.1	952.0
⑱	M1 M2 M1	10	–	160	23848	24168	32	773.4	476.8	10	–	160	27848	28168	32	901.4	555.7	10	–	160	31848	32168	32	1029.4	634.6
⑲	M1 M2	10	150	150	470	1240	94	116.6	71.9	10	150	150	500	1300	96	124.8	76.9	10	150	150	500	1300	96	124.8	76.9
⑳	M1 M2 M1	10	–	160	6900	7220	16	115.5	71.2	10	–	160	7000	7320	16	117.1	72.2	10	–	160	6960	7280	16	116.5	71.8
㉑	M1+0.2m M1 135° M2 0.2	10	150	1100	1556	4207	94	395.5	243.8	10	150	1100	1556	4207	96	403.9	249.0	10	150	1100	1556	4207	96	403.9	249.0
㉒	M1 M2 M1	10	–	160	6900	7220	20	144.4	89.0	10	–	160	7000	7320	20	146.4	90.3	10	–	160	6960	7280	20	145.6	89.8
TOTAL STEEL (Kgs)		9226.9								11267.6								13486.7							
TOTAL CONCRETE (cum)		163.05								205.64								236.37							

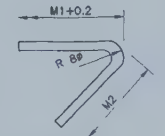
NOTES

1. JOINT OR LAPPING OF BARS SHALL BE SUITABLY STAGGERED AS PER CLAUSE 304.6 OF IRC:21–1987
2. FULL SCALE ELEVATION FOR THE BARS SHALL BE LINED OUT ON A PLAIN PLASTERED FLOOR TO THE DIMENSIONS SHOWN ON THE DRAWING SO AS TO GET CORRECT CLEARENCE BETWEEN DIFFERENT BARS AND THEN THE BARS SHALL BE BENT TO PROPER SHAPE.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING No. SD/109 (SHEET 1 OF 16).
4. QUANTITY OF CONCRETE DOES NOT INCLUDE GUARD STONES.
5. QUANTITY OF STEEL DOES NOT INCULDE 5% EXTRA FOR WASTAGE AND LAPS.

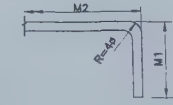
BENDING OF BARS



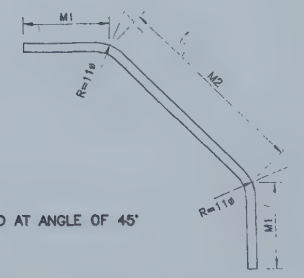
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

TRIPLE CELL BOX CULVERT
2m x 2m TO 3m x 3m
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C C BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/116 (SHEET 2 OF 3)

DRG.NO. SD/116 (SHEET 3 OF 3)

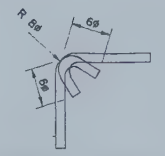
SCHEDULE OF REINFORCEMENT

BAR MARK	SHAPE OF BARS (NOT TO SCALE) / BOX – CELL DESIGNATION Nc/ab/Ec	3/33/3								3/33/4								3/33/5							
		BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.	BAR DIA. in mm.	SPACING in mm.	M1 in mm.	M2 in mm.	LENGTH in mm.	NO. OF BARS	TOTAL LENGTH in meters	WEIGHT in kgs.
①	M1 M2 M1	16	260	1250	10100	12600	93	1171.8	1849.5	16	240	1300	10200	12800	117	1497.6	2363.7	16	250	1330	10240	12900	129	1664.1	2626.5
②	M1	12	260	–	2050	2050	184	377.2	334.9	12	240	–	2050	2050	232	475.6	422.2	16	250	–	2050	2050	256	524.8	828.3
③	M1 M2 M1	12	260	1200	3650	6050	188	1137.4	1009.8	12	240	1250	3750	6250	236	1475.0	1309.5	16	250	1270	3830	6370	260	1656.2	2614.8
④	M1 M2 M1	16	200	260	10100	10620	121	1285.0	2028.2	16	180	260	10200	10720	156	1672.3	2639.5	16	170	260	10240	10760	189	2033.6	3209.8
⑤	0.2 M1 0.2 M2	10	200	160	3650	3970	242	960.7	592.3	10	200	160	3750	4070	282	1147.7	707.6	10	200	160	3830	4150	322	1336.3	823.9
⑥	M1 M2 M1	10	250	160	3650	3970	388	1540.3	949.7	10	250	160	3750	4070	452	1839.6	1134.2	10	250	160	3830	4150	516	2141.4	1320.2
⑦	M1 M2 M1	10	260	200	961	1361	186	253.1	156.0	10	240	200	1102	1502	234	351.5	216.7	10	250	200	1201	1601	258	413.1	254.7
⑧	M1 M2 M1	10	260	200	1031	1431	186	266.2	164.1	10	240	200	1173	1573	234	368.0	226.9	10	250	200	1244	1643	258	424.0	261.4
⑨	M2 M1 M1	12	150	200	10088	10488	160	1678.1	1489.8	12	140	200	10188	10588	200	2117.6	1880.0	16	220	260	10224	10744	146	1568.6	2475.8
⑩	M2 M1 M1	16	260	1200	10100	12500	93	1162.5	1834.8	12	240	1250	10200	12700	117	1485.9	1319.2	16	250	1300	10240	12840	129	1656.4	2614.3
⑪	M1	16	260	–	2050	2050	184	377.2	595.3	20	240	–	2050	2050	232	475.6	1172.9	16	250	–	2050	2050	256	524.8	828.3
⑫	M1 M2 M1	10	260	200	819	1219	372	453.5	279.6	10	240	200	890	1290	468	603.7	372.2	10	250	200	961	1361	516	702.1	432.9
⑬	M1 M2 M1	10	260	200	890	1290	372	479.8	295.8	10	240	200	961	1361	468	636.8	392.6	10	250	200	1003	1403	516	724.0	446.4
⑭	M2 M1 M1	10	250	160	23848	24168	72	1740.1	1072.8	10	250	160	27848	28168	72	2028.1	1250.4	10	250	160	31848	32168	72	2316.1	1428.0
⑮	M2 M1 M1	10	250	160	23848	24168	24	580.0	357.6	10	250	160	27848	28168	24	676.0	416.8	10	250	160	31848	32168	24	772.0	476.0
⑯	M2 M1 M1	10	250	160	23848	24168	72	1740.1	1072.8	10	250	160	27848	28168	72	2028.1	1250.4	10	250	160	31848	32168	72	2316.1	1428.0
⑰	M2 M1 M1	10	250	160	23848	24168	72	1740.1	1072.8	10	240	160	27848	28168	78	2197.1	1354.6	10	220	160	31848	32168	84	2702.1	1666.0
⑱	M2 M1 M1	10	–	160	23848	24168	32	773.4	476.8	10	–	160	27848	28168	32	901.4	555.7	10	–	160	31848	32168	32	1029.4	634.6
⑲	M1 M2	10	150	150	550	1400	138	193.2	119.1	10	150	150	600	1500	138	207.0	127.6	10	150	150	650	1600	140	224.0	138.1
⑳	M1 M2 M1	10	–	160	10100	10420	16	166.7	102.8	10	–	160	10200	10520	16	168.3	103.8	10	–	160	10240	10560	16	169.0	104.2
㉑	M1+0.2m M1 135° M2 0.2	10	150	1100	1556	4207	138	580.6	357.9	10	150	1100	1556	4207	138	580.6	357.9	10	150	1100	1556	4207	140	589.0	363.1
㉒	M1 M2 M1	10	–	160	10100	10420	20	208.4	128.5	10	–	160	10200	10520	20	210.4	129.7	10	–	160	10240	10560	20	211.2	130.2
TOTAL STEEL (Kgs)		16341.3								19704.3								25104.6							
TOTAL CONCRETE (cum)		298.06								384.25								468.42							

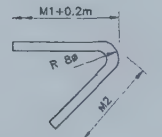
NOTES:

1. FOR ALL NOTES REFER DRG. NO. SD/116 (SHEET 2 OF 3)

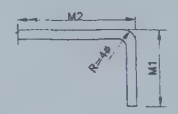
BENDING OF BARS



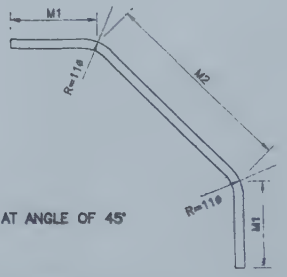
BEND WITH CLOSE HOOKS



BEND AT ANGLE OF 135°



BEND AT RIGHT ANGLE



BEND AT ANGLE OF 45°

LEGEND : ø SHOWS DIA. OF BAR

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

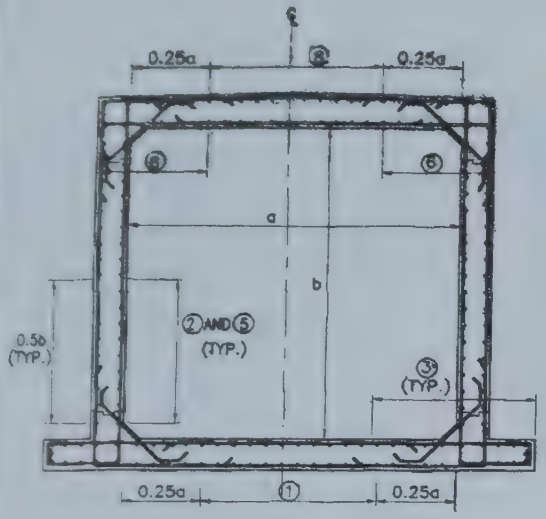
TRIPLE CELL BOX CULVERT

2m x 2m TO 3m x 3m

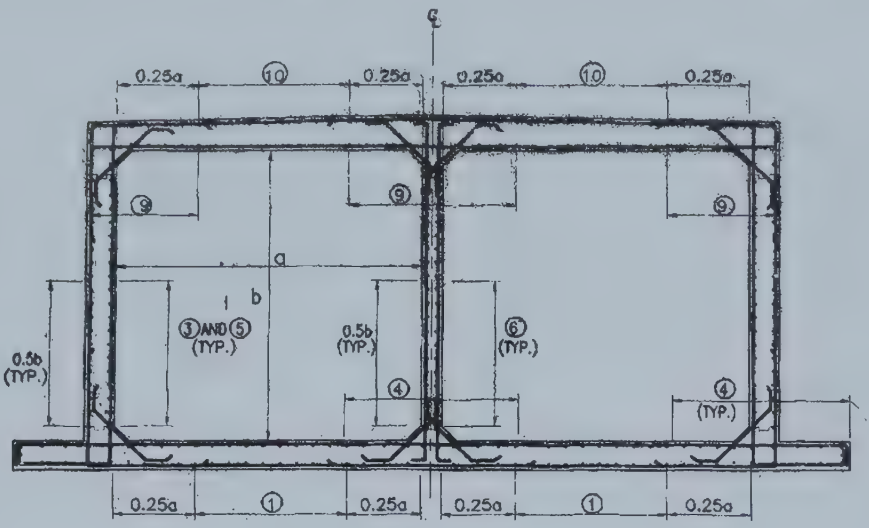
(WITH EARTH CUSHION)

BAR BENDING SCHEDULE

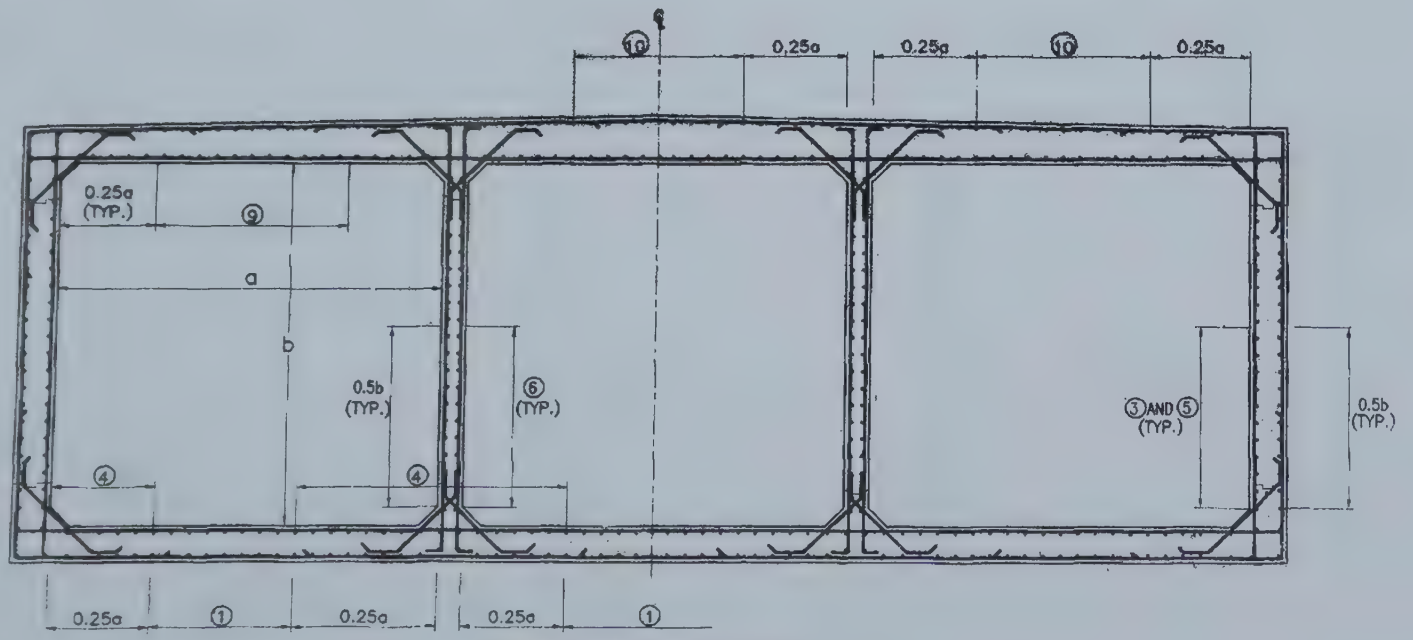
DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C.BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/116 (SHEET 3 OF 3)



SINGLE CELL BOX CULVERT



DOUBLE CELL BOX CULVERT



TRIPLE CELL BOX CULVERT

NOTES:

1. FOR GENERAL NOTES REFER DRG. NO. SD/101.
2. FOR GENERAL ARRANGEMENT REFER DRG. NO. SD/103 (SHEET 1 OF 2), SD/105 & SD/107.
3. FOR REINFORCEMENT DETAILS REFER
   DRAWING NO. SD/109 (SHEET 1 OF 15)
   DRAWING NO. SD/114 (SHEET 1 OF 4)
   DRAWING NO. SD/116 (SHEET 1 OF 3)
4. LAP IN VERTICAL BARS SHOULD BE PROVIDED AT LOWER CONSTRUCTION JOINT WITH IN THE PROVIDED ZONE.

LEGEND:

⑩ : SHOWS LAP ZONE FOR BAR MARK–10

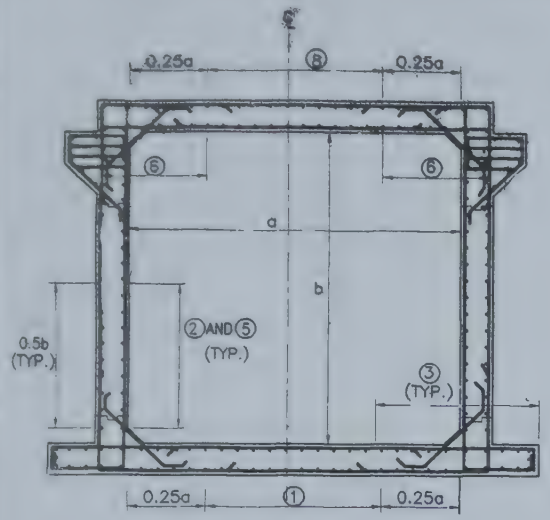
0.25a (TYP.) : DIMENSIONS

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING) , NEW DELHI.

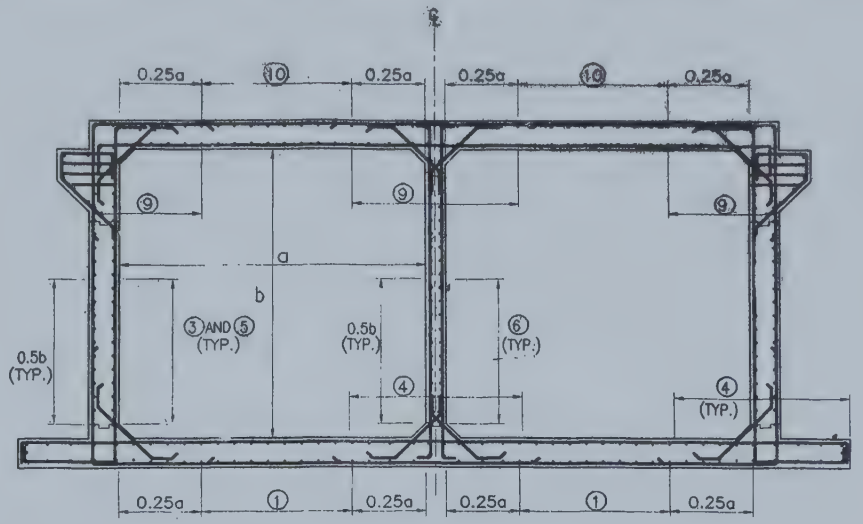
STANDARD DRAWINGS FOR BOX CELL STRUCTURES

LAP ZONE DETAILS (WITH EARTH CUSHION CASE)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C BHATTACHARYA) C.E (R) S&R MOST	DRG NO. SD/117 (SHEET 1 OF 2)



SINGLE CELL BOX CULVERT



DOUBLE CELL BOX CULVERT

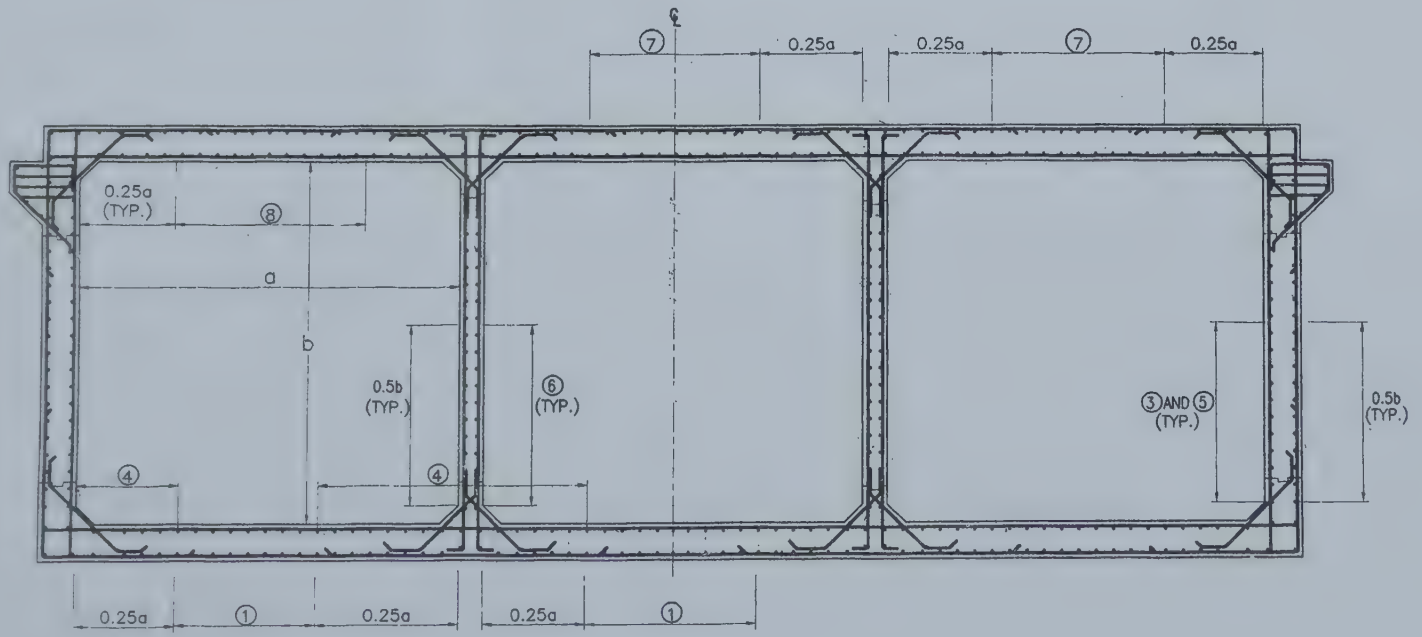
NOTES:

1. FOR GENERAL NOTES REFER DRG. NO. SD/101.
2. FOR GENERAL ARRANGEMENT REFER DRG. NO. SD/102 SD/104 & SD/106
3. FOR REINFORCEMENT DETAILS REFER
   DRAWING NO. SD/108 (SHEET 1 OF 6)
   DRAWING NO. SD/110 (SHEET 1 OF 2)
   DRAWING NO. SD/112 (SHEET 1 OF 2)
4. LAP IN VERTICAL BARS SHOULD BE PROVIDED AT LOWER CONSTRUCTION JOINT WITH IN THE PROVIDED ZONE.

LEGEND:

⑩ : SHOWS LAP ZONE FOR BAR MARK-10

0.25a (TYP.) : DIMENSIONS



TRIPLE CELL BOX CULVERT

GOVERNMENT OF INDIA
MINISTRY OF SURFACE TRANSPORT
(ROADS WING), NEW DELHI.

STANDARD DRAWINGS FOR BOX CELL STRUCTURES

LAP ZONE DETAILS (WITHOUT EARTH CUSHION CASE)

DESIGNED BY	CHECKED BY	APPROVED FOR ISSUE BY	1999
(A.R.GHOSH) CES (I) LTD	(M.C.TANDON) TCPL	(C.C BHATTACHARYA) C.E (R) S&R MOST	DRG. NO. SD/117 (SHEET 2 OF 2)